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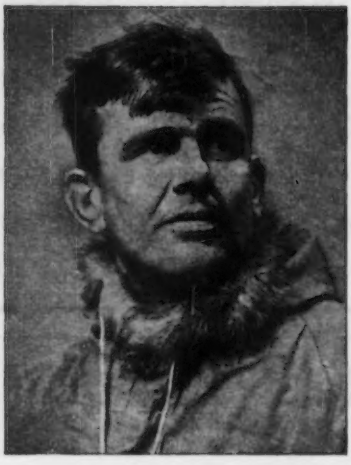

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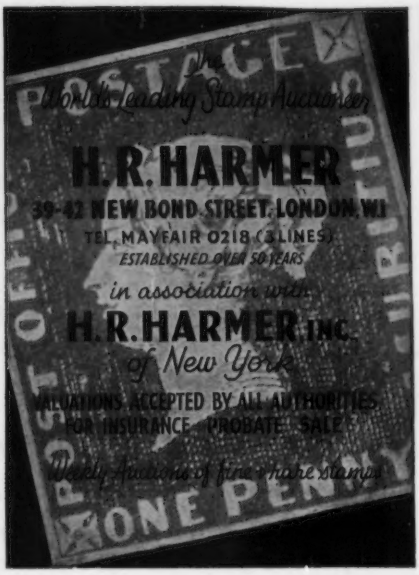
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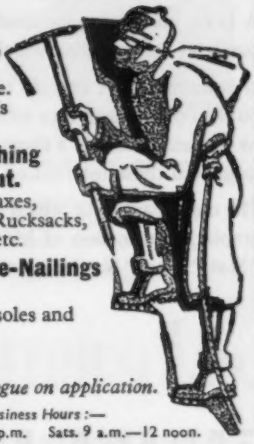

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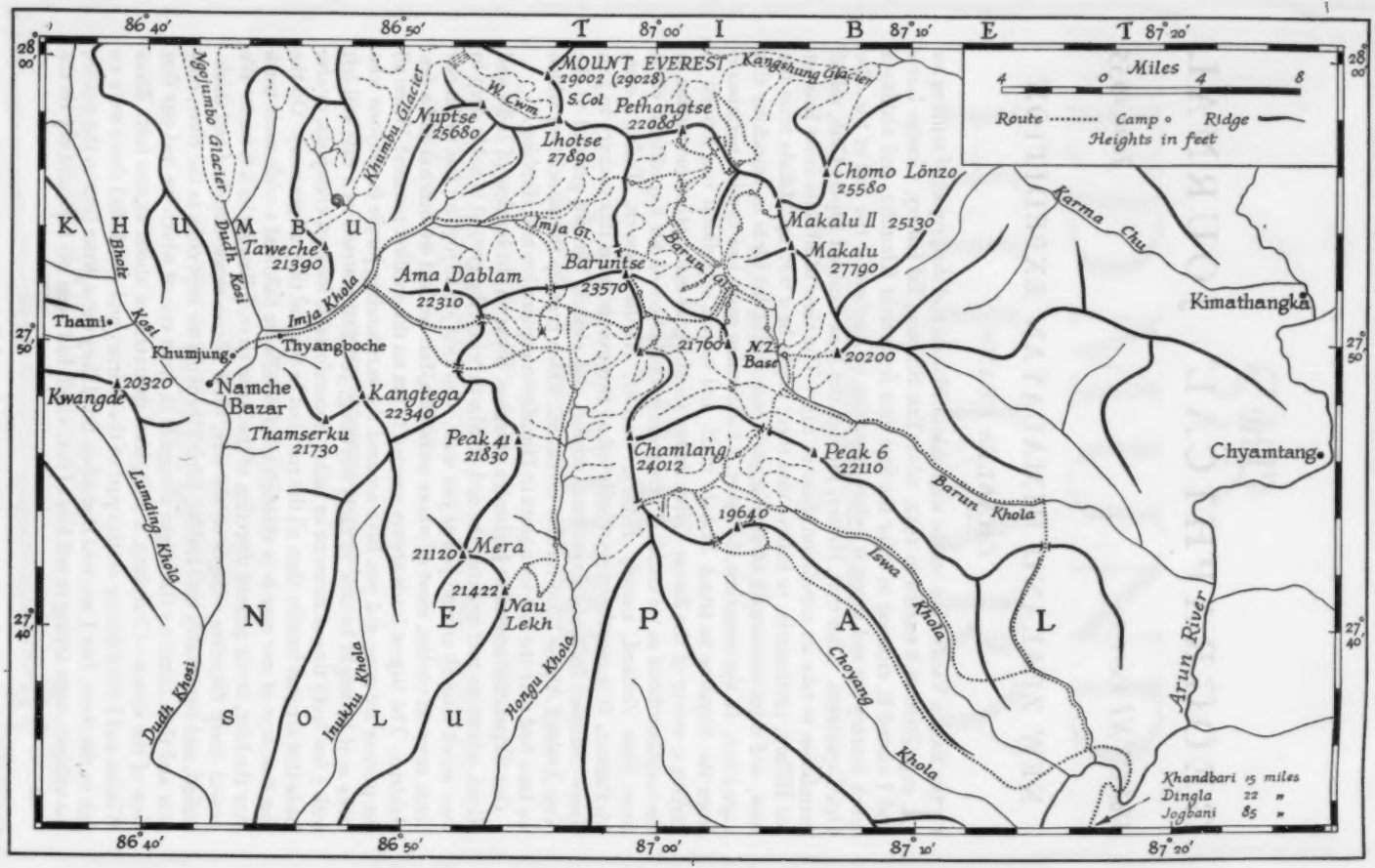
NEW ZEALAND HIMALAYAN EXPEDITION

CHARLES EVANS

THE BARUN VALLEY lies on the west side of Makalu and the project of sending an expedition to it started in 1952, when Eric Shipton, Ed Hillary, George Lowe and I visited it, crossing to it for the first time from Solu Khumbu, and making a quick journey up and down it before returning to England at the end of the Cho Oyu Expedition. After that, Hillary, through the New Zealand Alpine Club, asked permission to take an expedition there in 1954. The view of Makalu from Everest led Hillary, particularly, to believe that there might be a way up Makalu from the west, and a reconnaissance of such a route was one of his ideas in launching this expedition. In the meantime, however, a Californian party had specific permission from the Nepalese to attack Makalu itself, and so our expedition was limited to making a survey of the Barun Valley and to climbing as many other mountains in the neighbourhood as we could. There were ten members of our Expedition: eight from New Zealand, namely Hillary, Harrow, Hardie, Beaven, Todd, Lowe, McFarlane, Wilkins; they very kindly asked two people from this country to join them—Michael Ball, the Expedition doctor, and myself. We are grateful to the New Zealand Alpine Club for this invitation, which kept up the association which we have had over the last four years in Himalayan exploration and climbing.

Our Expedition started at Jogbani, a village of Bihar on the borders of India and Nepal, where we met towards the end of March when the ground is ankle deep in dust which rises all around you as you walk. Our first job at Jogbani was to get our loads away on coolies, most of whom were men, but we had women too and a few children. The largest loads always seemed to get on the smallest porters! When all the porters are gone and you have scoured the surrounding jungle for anyone who looks as if he might be able to carry anything, you find yourself as a rule still left with a few leaky tins of kerosene or rather uncomfortable loads of crampons, or else loads that are just heavier than all the rest, but in the end they all get away. On the first few days of our march in through the foothills we followed a wide mule track over the hills, in the general direction of the Arun river, following its left bank. We passed many Nepalese villages on the way, their houses straw-thatched and thick-walled, and remarkably cool inside. After Dhankuta we kept close to the river, only now and then climbing the ridges alongside it, from one of which we had our first view of the snows—Chamlang, a long, level mountain of about 24,000 feet. Brian Wilkins and I tried fishing on this part of the journey and concluded there were no fish in the Arun, but I am told that when Ed Hillary came down later in the season, the villagers were trying to sell lots of fish which had been left high and dry on the



Map showing routes of the New Zealand Himalayan Expedition 1954

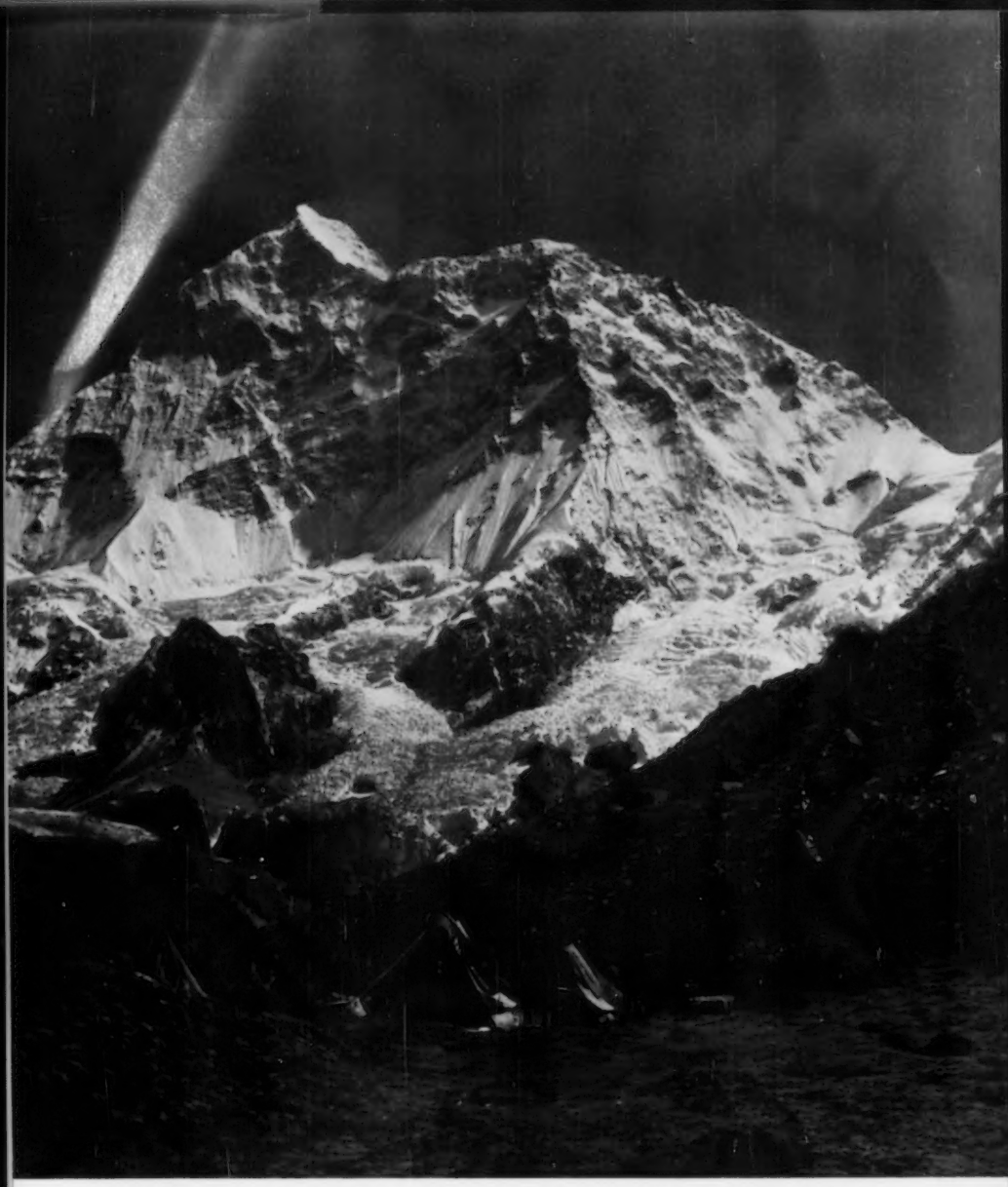
banks after floods. On the march our dress was rubber-soled gym shoes, short shorts, and usually the umbrella without which no Himalayan climber's gear is complete.

Near Dingla, about a week's march in, Hillary and I crossed the river by dug-out to recruit local porters, while the rest of the Expedition continued up the left bank to the village of Khandbari. After a fruitless search for coolies at Dingla, we joined the others at Khandbari where we found the whole village playing Rugby football. We now paid off the lowland coolies and engaged some peculiar looking characters from higher up the Arun, who carry heavy loads. Some had their families with them and all were pressed into service, the small ones at half-price. We were now in higher country up to 6000 or 8000 feet, and after two days' march up the left bank, we came to a place where we crossed the Arun for good and all. The crossing was shaky—a bamboo suspension bridge, at one end of which was a straw-thatched gin-shop, a visit to which was a necessary preliminary to facing the bridge. Part of this bridge had to have some repair work done by the villagers before it was safe for laden people to cross it.

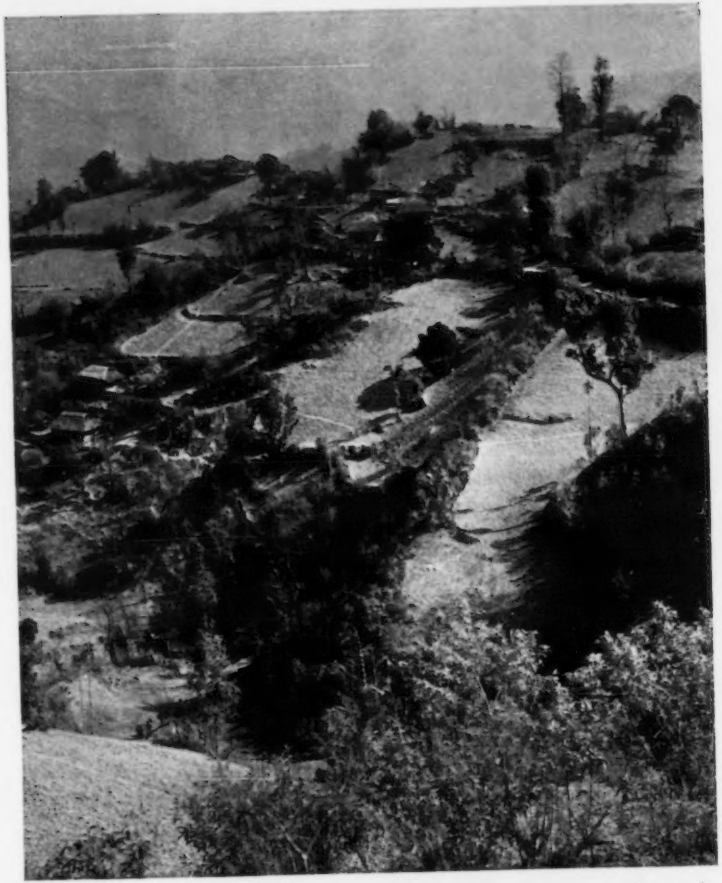
On the right (the west) bank of the Arun, we climbed into higher country, where the villagers are Sherpa people of a kind, with Tibetan style dress, and owning yaks for cross-breeding. The party was now split into three to make a survey of three valleys—the Barun, the Iswa and the Choyang. They all lead down from Chamlang, running parallel as far as the main Arun. Ed Hillary, Michael Ball, Jim McFarlane and Brian Wilkins went up into the Barun itself with the main baggage, and established base camp at the foot of the south face of Makalu, at 14,000 feet. Colin Todd, Bill Beaven, Norman Hardie and George Lowe went up the Iswa, explored its upper reaches and then crossed into the Barun. Geoff Harrow and I came up the Choyang, followed it to its headwaters, and then, failing to cross over to the Hongu as we had hoped, followed George Lowe's party into the Barun. All three parties went through very similar country: first, a region of rhododendrons, which we admired very much at first, but which after a few days we came to regard with less enthusiasm as it obstructed our path; and then a region of winter snow, dwarf rhododendron and primulas. In the winter of 1953–4 there had been a very heavy snowfall in this part of the country and, as a result, in April we found drifts in the most unexpected places. Many of our porters, coming over into the Barun, had trouble crossing snow-drifts in bare feet, but they were very stout about it, and most of them managed to stick it for a day or two; usually the drift would only be a few hundred feet wide, and then one would come to a bit of easier ground among the rhododendrons, and then perhaps another drift. On one of these drifts, in the Choyang, Geoff Harrow and I were attracted by the shouts of Sherpas just above us, who explained that they had found the tracks of the *yeti*. We went up eagerly to see these tracks, but we were a bit disappointed because they were small, about 8 inches by 4 inches, and had well-marked toe and claw marks. We thought they were probably made by a bear; the tracks were those of a big animal followed by a small animal, a full-grown bear followed by a little one. While in the Choyang, thinking to complete our survey of it, Geoff Harrow and I took the theodolite up a peak of 19,640 feet on the Iswa–Choyang divide. But we took it to no purpose, because when we got on top we found ourselves in cloud. We crossed over into the Iswa where Lowe's party had explored, and tried to reach the Hongu. Unable to do this, since our chosen pass was too difficult for our unwieldy party, we joined the main party at the Barun base camp. Dr. Siri's American party had preceded us up the Barun, and our two base camps were close together under the south-west face

of Makalu. They had reached a saddle on the south ridge of the mountain, from which they were now preparing to tackle the extremely difficult upper half of that ridge.

When Harrow and I reached base camp at the end of April, and joined the remainder of the party, we were greeted with the news that Jim McFarlane and Brian Wilkins had met with an accident up at the head of Barun. They had been exploring a pass from the Barun to the Kangshung and were coming down, tired, late one afternoon over a glacier which was very badly crevassed, when Wilkins, who was in front, fell through a hidden crevasse. He fell about 30 feet before the strain of the rope came on McFarlane, and the impact jerked McFarlane after Wilkins into the hole. Wilkins fell 60 feet down in two stages: he fell 30 feet, and then was slightly checked, and then fell a further 30 feet. McFarlane unfortunately fell the whole distance without much check at all. As a result of this, McFarlane was badly bruised at the bottom of the crevasse (which was fortunately floored with soft snow) whereas Wilkins was only slightly injured. McFarlane was concussed and had some injuries to his back. He wasn't able to move, and he was dazed. Wilkins managed to crawl out of the crevasse by going along to one side and somehow finding a zig-zag way up well away from the point at which they had fallen into it, and then finally emerging, after some hard climbing, on the surface of the glacier. He then went down to their camp, where he found Hillary and several Sherpas, and gave the alarm. He was by this time very exhausted, and was put to bed, while Hillary went up with the Sherpas to see if he could get McFarlane out. They got to the crevasse and the Sherpas lowered Hillary on the end of a rope until he was about 10 feet above McFarlane. There was a lot of difficulty in communication, there was a high wind blowing, and it was beginning to get dark, and while Hillary shouted from below and a Sherpa shouted from above, neither could understand what the other was saying. Finally, the Sherpas, after he had been within 10 feet of McFarlane, and able to talk to him, pulled Hillary up again. The crevasse had an overhanging lip, and when Hillary came to the edge of it, he stuck because here the rope had cut into the snow. The Sherpas' first reaction was all to get on the rope and pull as hard as they could. As a result of this, they pulled him against the edge of the crevasse and broke three of his ribs. Finally, however, Hillary managed to get a hand and an ice-axe out above the crevasse, and was pulled out. He was very knocked up by this time, and it was nearly dark, and all they could do then was to lower two sleeping-bags to McFarlane and make sure that he got inside them for the night. He called up that he was inside these bags and quite snug. His rescuers went down and returned next morning at first light. We know now that he must have been confused at the time, probably because of his concussion, and that instead of getting into these bags, he had just sat on top of them feeling, as he said to me afterwards, that "it wasn't cold, but just pleasantly cool." Unfortunately, because of this, his hands and his feet were badly frostbitten, and when he was finally rescued next morning they looked very bad indeed—discoloured, swollen and clawed. The next three days were occupied in getting him down to base camp, a trying journey for both patient and rescuers and one which took toll of our whole Sherpa strength. McFarlane was down at base camp for about a month, during which time Michael Ball looked after him and cared for his hands and his feet. He improved so much that at the end of the month he was in far better condition than he had been when he was first rescued, and a lot of the credit for his recovery goes to his personal Sherpa, Angyi. When you have an injured man whose hands and feet are equally useless to him, who can't sit up, or feed himself, or hold anything in his hands,



Makalu (27,790 feet) from Base Camp near the terminal of the Barun glacier



Khandbari: early spring fields terraced and ploughed ready for maize and wheat

Evans, Lowe and Hillary on the march in

then a good nurse is worth her weight in gold. We had no good nurses with us, but we did have a very good substitute in Angyi, and he looked after Jim for that month as well as any nurse could have done.

When McFarlane had been settled down at base camp, and it seemed that there was nothing more to be done for him immediately, we set about planning what we should do with the next few weeks of the expedition. We turned our attention first to Makalu, and explored the route up the west face to the col between Makalu I and Makalu II. After two or three intermediate camps we put a camp at 23,000 feet on the face, from which Harrow and I were able to make a reconnaissance towards the col; as a result of this we concluded that there was a possible route up to the saddle between the two peaks of Makalu. Hillary, Beaven, Hardie and Lowe then took over from Harrow, Todd and myself in the 23,000-foot camp. Unfortunately, two days later Hillary, who had been suffering from his ribs, became very ill at this camp with a complaint which we afterwards thought must be malaria; he was desperately ill for about a week, and he had to be carried down. Another rescue party was organized, and he was carried right down into the Barun valley. The carry took four days.

We were now too weak to continue the attempt on the Makalu col and so the Expedition divided into a number of different parties: some to explore the head of the Barun, others to attempt Baruntse. I stayed down at base camp with the two invalids Ed Hillary and Jim McFarlane, so that Michael Ball could go and have a chance to climb at the head of the Barun. He had a week up there, during which he climbed four peaks of over 20,000 feet, a very fine series of successes.

While we were down at the base camp, the problem that occupied us was the evacuation of the casualties. Ed Hillary was rapidly recovering, and it was clear he would shortly be able to walk out. But with Jim McFarlane it was quite a different story. His feet were in a very bad shape and we slowly realized that they would ultimately have to be partly amputated. There was no question of his walking out. A stretcher party, with four or five men carrying a stretcher, is a very tedious way of carrying anyone over long stretches of rough country, and so we made a box out of one of our chests so that he could be carried in it as in a chair on a coolie's back. How he was carried over the various bridges, which had seemed hard enough on the way in, I don't know. It is a tribute to McFarlane's own fortitude that he was able to stick the journey, and all in keeping with the very great courage which he displayed during the month when he was at base camp, injured and unable to take part in the activities of the rest of the Expedition.

During this time, towards the end of May, at the head of the Barun, Hardie, Ball and Wilkins had climbed Pethangtse (22,080 feet) and several peaks near it, and when Ball and Wilkins had come to the end of their time and had to go down and join the party that was returning to Jogbani with the two casualties, Norman Hardie stayed up there to complete a survey and to cross over a new 22,000-foot pass to the Imja and Solu Khumbu. Shipton's party had rejected this pass in 1952 but Hardie was determined to cross it, and by a great deal of hard work and a great deal of skill he managed to find a way down the Imja side of it with three Sherpas: Urkien, Aila and Ang Dawa. While this was going on, Lowe's party had gone up on to the plateau between the Barun and the Hongu, and had climbed Baruntse, or Peak 38 (23,570 feet). From a camp at the foot of the south ridge of Baruntse they reached the narrow middle part of that ridge. Bill Beaven was in front, with Lowe on the same rope, and Colin Todd and Geoff Harrow were behind. Beaven was going along the west slope of the ridge, stamping steps, when suddenly the whole of the

ridge above him vanished into space. He found himself standing on what had now become the crest of the ridge, looking down the Barun side, while Lowe had jumped down on the Hongu side to hold the rope. They were a bit taken aback by this collapse of a cornice, and when the other two came up, suggested it was time for Todd and Harrow to have a chance to go first. So off they went, keeping a bit lower down, and cutting in steep hard snow for several hours. The work was so slow that there was no question of Beaven and Lowe following them that day. When they got to about 23,000 feet the ground got easier, and they reached the top at 4 o'clock in the afternoon. Coming down, they had just as much trouble as they had had going up, because many of the steps had filled up with snow. It was well after dark when they rejoined their companions down at the highest camp. The next day was a day off, but on the following day, George Lowe and Bill Beaven repeated this climb, making the second ascent of Baruntse, again by the same route, virtually once more a first ascent because the steps had disappeared and all the work of breaking the trail and cutting the steps had to be done over again.

During this time I had seen our invalid party off, and brought the mass of our heavy baggage up to the Barun plateau to join the Baruntse party. On the way I climbed a peak of 21,760 feet for the sake of doing some survey from near the top of it, and when I reached the Barun plateau, Lowe's party had just come down from their successful climb. They now went west into the Hongu itself, and Beaven and Todd broke off to climb another 20,000 ft. peak, Nau Lekh, before going on to Solu Khumbu. All members of the Expedition met finally in early June at the 14,000-foot Sherpa village of Khumjung, where we spent a week enjoying the company and hospitality of the Sherpas with whom we had spent the past months, and where, at Da Tensing's house, the Sherpas gave us an uproarious party before we all started on our various ways home.

DISCUSSION

Evening Meeting, 13 December 1954

Before the paper the PRESIDENT (General Sir JAMES MARSHALL-CORNWALL) said: Before introducing our lecturer I would like to express the deep sorrow felt by the Fellows of this Society, in which I know all Everest climbers will join me, at the death of Lieutenant-General Edward Felix Norton who passed away on November 3 last. General Norton was a member of the 1922 and 1924 Everest Expeditions. In 1924, just thirty years ago, he climbed alone to the height of 28,146 feet without oxygen, which no man had ever done before. He was a great sportsman and a very much beloved Fellow of this Society.

I would like to read a tribute to him by Field-Marshal Lord Alanbrook published in the Royal Artillery Regimental Gazette: "A keen soldier and the best of sportsmen, he knew better than most how to combine work with pleasure while excelling in both. His lion-hearted tenacity and strength of purpose in the face of hardships, difficulty, exhaustion and danger are well exemplified by his heroic attempts in the conquest of Everest. He was universally popular and admired throughout the Regiment. He leaves behind memories of an outstanding life. He played a prominent part in fostering all those qualities of manhood which represent what is best in the Regiment." General Norton was awarded the Founder's Medal of the Royal Geographical Society in 1926 after his great achievement on Everest.

Tonight we come away from the echoes of the past to the latest achievements of mountaineering in the Himalaya. We are to hear Charles Evans, deputy leader to Sir John Hunt in last year's successful ascent of Everest, and this year deputy to Sir

Sherpas carrying McFarlane to Base Camp

Hillary being carried to the improvised stretcher at Camp III on the Makalu glacier

Baruntse (23,570 feet) from the South

Edmund Hillary in the New Zealand Alpine Club's Expedition to the Barun region, about 15 miles south-east of Everest.

Mr. Evans then delivered his lecture

The PRESIDENT: After that fascinating description of those somewhat perilous climbs and the beautiful pictures we have seen, I would only like to add that the climbers did not spend all their time in scaling peaks and kicking Rugby footballs about. They did a good deal of serious survey work, because such an expedition can add, as this expedition has done, to our geographical knowledge of unknown regions.

We are honoured to-night by having with us our guest the Acting High Commissioner for New Zealand. I now ask His Excellency if he will kindly add a word or two.

The ACTING HIGH COMMISSIONER FOR NEW ZEALAND (Mr. R. M. Campbell): My words will be very brief. All in this hall have been transported from London to a new world, and having had the lecture by Charles Evans and the comments by George Lowe as well as the pictures, I am sure we could not have spent a happier evening. Those associated with New Zealand would wish me to say "Thanks no end" to the Royal Geographical Society for their part in making the Expedition in cooperation with the New Zealand Alpine Club. The party to-night with Charles Evans and our own George Lowe is as fine an example of cooperation as there was in the Expedition itself.

THE SOVIET NORTHERN SEA ROUTE

T. E. ARMSTRONG

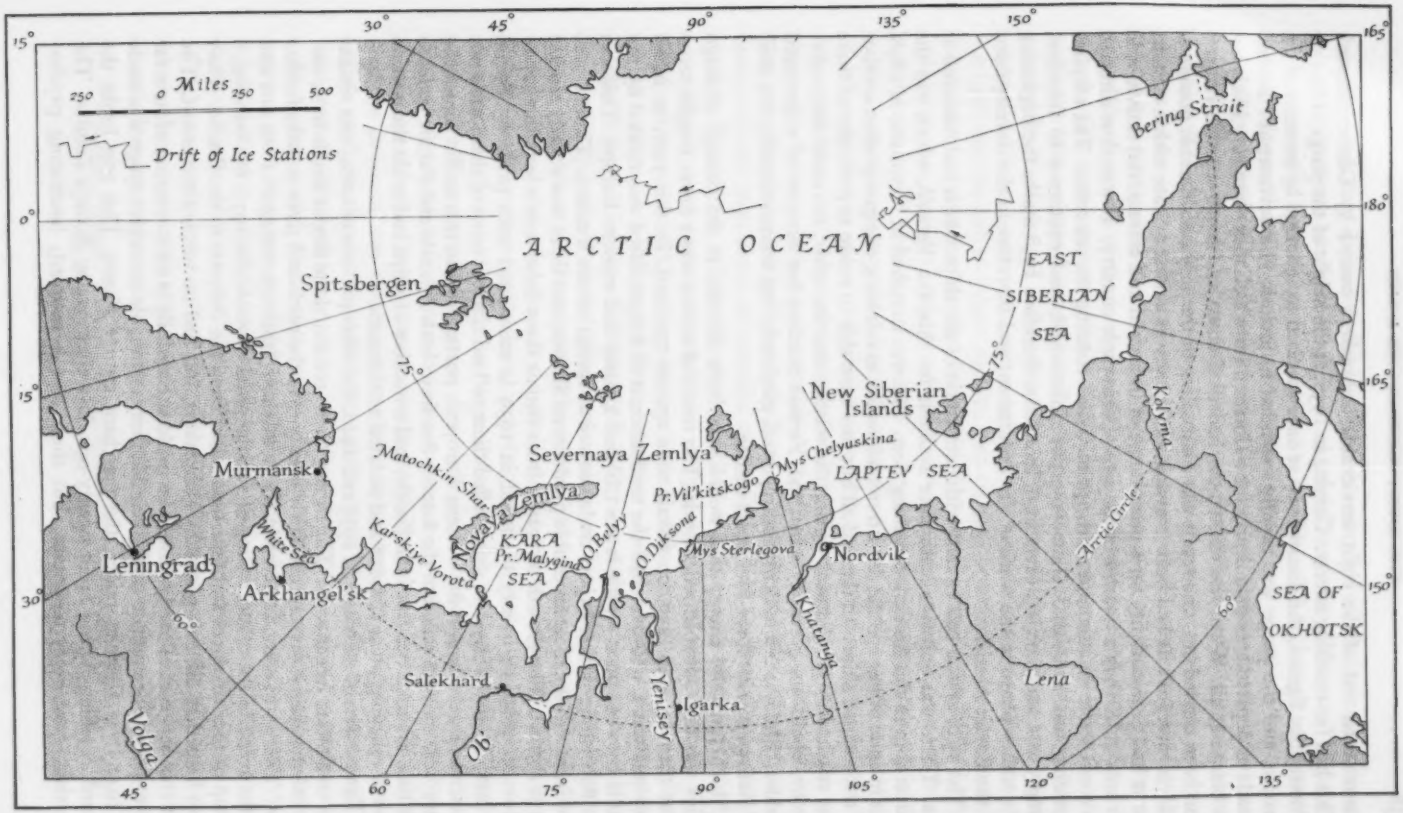
ONE OF THE most interesting, and perhaps one of the most spectacular developments in the Soviet Arctic since the Revolution has been the attempt to run a freight-carrying sea route along the north coast of Siberia. These waters are icebound and impassable for shipping for at least seven months in the year—in some parts for eight, nine or ten. In the remainder there is still plenty of ice about, and this in turn causes fogs which tend to be most frequent in the months when there is least ice. So it is not a very easy place for seafaring.

This is not a purely Soviet idea, of course. It has a history, and quite a long one,[1] for this is the old North East Passage. But since I want to make this talk as nearly topical as the existence of an Iron Curtain will permit, I will cover the history in a couple of sentences. Before the Revolution ships had sailed fairly regularly into the waters at either end of the 3000-mile coastline: in the west from the North Atlantic into the Kara Sea, where the lower reaches of the big Siberian rivers Ob' and Yenisey were the destinations; in the east, from the Pacific through Bering Strait to the river Kolyma. But the whole length of the route had only once been navigated, by the Swedish explorer Adolf Erik Nordenskiöld in 1878–79. In Soviet times it was decided to put a large effort into making this route work. If all points along the north Siberian shore could be made regularly accessible to shipping, then an enormous area of hitherto unexploitable territory could be made useful. There was possibly a strategic side as well: by using the Northern Sea Route (as this waterway came to be called), Soviet ships might pass between European and Far Eastern Russia without crossing foreign and potentially hostile waters, and indeed practically without losing sight of the Russian coast.

Making the route work involved organizing a large number of ancillary services. A fleet of icebreakers had to be built up and maintained; the imperative need of having the best possible weather and ice reports meant establishing a network of meteorological stations (by the outbreak of war there were about seventy along the coast of the islands and mainland) and keeping a number of aircraft for ice reconnaissance flights; a hydrographic service was needed to chart these largely unknown waters and to provide lights and buoyage; finally, a large staff of scientists working mainly under the control of the Arctic Institute at Leningrad dealt with the many scientific problems. All this activity was coordinated by a Government Department set up specially for the purpose in 1932—the Chief Administration of the Northern Sea Route (Glavsevmorput' is the Russian portmanteau word for this).

The efforts of Glavsevmorput' resulted in a quick expansion of traffic along the route in the middle 1930's. The year 1936 was particularly good, with over one hundred ships sailing on various parts of the route during the season. Operations in 1937 were planned on an ambitious scale, but there was a major disaster. Difficult ice in the central part of the route, and inadequate ice reconnaissance were factors in creating a situation in which twenty-six ships were forced to winter at sea, among

[1] There is some information on this in my book 'The Northern Sea Route: Soviet exploitation of the North East Passage' (Cambridge, 1952). I have used other parts of the book as a source for this paper. Any information for which a source is not quoted may be assumed to come from there.



The Northern Sea Route. The courses of the two drifting stations are for the first nine months of their drift, from April 1954 until January 1955

them seven out of the eight serviceable icebreakers owned by Glavsevmorput'. This had far-reaching effects. Coming in 1937, at the height of the purge of leading Communist figures, the disaster was at once ascribed to sabotage by enemies of the people, and the purge was rapidly extended to include Glavsevmorput'. Several heads of departments paid dearly for a situation for which they were very likely not to blame at all. When the excitement had died down and more sensible reforms had been carried out, one result was a curtailing of the very considerable powers of Glavsevmorput'. It had been growing into what was almost a State within a State, for it had responsibility for a great range of industrial and commercial activities in an area more than a quarter of the size of the whole country. It was now directed to concentrate its attention on the prime task—running the sea route. The empire-building was over, and Glavsevmorput' functioned, and continues to function, simply as a sea transport executive. In a sense therefore 1938 marks the beginning of another phase in the work of the department and therefore in the development of the Soviet Arctic.

The 1938 season had to start with extrication of the ships which had wintered at sea. There was only one icebreaker available for this, the *Yermak*, which was the oldest ship in the Arctic icebreaking fleet. She was launched in Newcastle in 1898, but in spite of her age she did a tremendous job in releasing one group after another of the trapped ships. In the end all but two were able to steam to port; one of these was crushed by ice and sank during the winter, and the other, the small icebreaker *Sedov*, could not get away when the *Yermak* reached her because of a damaged rudder. She was left to drift, and repeated, gloriously but unintentionally, the drift of Nansen's *Fram* forty-four years earlier.

Much time and energy that would have been devoted to the passage of cargo ships was thus spent in relief work. The result of course was a lower freight turn-over than in 1936 (256,000 metric tons against 271,000). In this year, as in all previous years, well over half the total amount of freight lifted was carried by the traffic between ports on the lower Ob' and Yenisey and western Europe. This was the flourishing timber export trade centred at Igarka on the Yenisey. Timber was, and is, one of the most accessible products of Siberia, and there was a ready market for it abroad. The growth of Igarka from two or three fishermen's huts in 1927 to a lumber town of twenty thousand in 1939 is mentioned with pride by Soviet writers. In 1938 forty-five ships called there to load timber; most of them were not Soviet and were bound for western European ports. Besides this traffic across the Kara Sea, convoys sailed to the Laptev Sea from both Atlantic and Pacific ends, to the East Siberian Sea from the Pacific, and a number of ships had to do the routine jobs of relieving polar stations and isolated settlements.

The pattern of activities in 1939 and 1940, the other pre-war seasons, was similar but on a rather larger scale. The timber traffic remained the largest single item, and the other voyages were spread fairly evenly over the ports and river mouths further east. There was some increase in the number of "through voyages" from one end of the route to the other, calling at various ports *en route*. In 1939, for instance, a group of four dredgers and four tugs sailed from the Atlantic to the Pacific. They were helped at difficult places by icebreakers, but had no whole-time escort. The fact that this sort of voyage could be made successfully is an indication of how far the route had been made workable. Another remarkable through voyage was made in 1940 by a German raider, the merchant cruiser *Komet*. This trip broke the record, reaching Bering Strait twenty-one days after leaving Novaya Zemlya. The Russians gave every assistance, but there was a moment, fascinating psycho-

logically, when they apparently felt bad about it and called off the icebreaker escort. But the *Komet* was nearly through by then, and it made no difference. The year 1940 also saw the first voyage from one end to the other and back again in the same season; this was done by the icebreaker *Iosif Stalin*.

During this period the Soviet icebreaker fleet received important reinforcements. It had hitherto consisted almost exclusively of British built ships launched before or during the First World War. They were still giving good service—some are doing so even now—but the lack of powerful modern vessels was being keenly felt. Glavsevmorput' put in hand a building programme in 1935. In 1938, after many delays, the first ship of the four planned, the *Iosif Stalin*, reached the Arctic. She was the first icebreaker to be built in the Soviet Union, and was, when she was built, the best-equipped icebreaker afloat. She was about the same size and power as the biggest of the old ships—11,000 tons maximum displacement and 10,000 total normal horse power—but had many improvements in design: greater strength was built into the hull and three aircraft, with catapult launching gear, were carried. There was one poor feature—she burnt coal. Experience outside the Soviet Union had shown that Diesel-electric power was much superior in performance and better suited to the job. This was recognized by Soviet engineers, but presumably the deciding factor was the availability of coal in the Soviet Arctic and the absence of oil. The *Stalin* was followed by three sister ships. All four were in service by the end of the war, and they quite transformed the icebreaker fleet. During the war there were further additions, this time from the United States. Under Lend-lease, three *Northwind* class ships were transferred to the Soviet Union. They had just been built and were about as powerful as the *Stalin* class but with Diesel-electric engines. They were returnable at the end of the war, and after innumerable requests they were in fact returned, one in 1949 and the other two in 1951. The fact that they came back at all seems to indicate that they had by then been replaced by other ships. It is known that Soviet designers had plans both for an improved version of the smaller type of British-built icebreaker and for ships of a much larger size—even up to 24,000 tons displacement and 52,000 h.p. But there is no information on what has in fact been built. There have, however, been important additions from foreign sources. It is known that the Finns, in payment of reparations in 1944, had to hand over six icebreakers, including their biggest, the *Jääkarhu*.[1] The Russians have also ordered three large Diesel-electric icebreakers from Finnish yards. The Finns are building one like these for themselves at the same time. Theirs, the *Voima*, is finished now. She is about as powerful as the *Stalin* but not so big, 10,500 h.p. and 4500 tons displacement.[2] The first ship for the U.S.S.R., the *Kapitan Belousov*, was due for delivery in December 1954. Meanwhile from a Dutch yard three more Diesel-electric ships have been delivered; the last, of 6000 tons, in September 1954.[3]

But we are getting ahead of the story. We left the Northern Sea Route in its last pre-war navigation season. It was a season of considerable activity and the total freight turnover is thought to have been nearly half a million tons. This is the last absolute figure we have (and it may be somewhat exaggerated). We do have one other interesting piece of information, however. During the war the Germans captured a copy of the Soviet State Plan for 1941, a document which was not for publication but for limited circulation in Government departments. The Americans

[1] Ramsay, Henrik, 'I kamp med östersjöns isar' (Helsingfors, 1947), p. 301.
[2] *Finlands Flotta*, No. 3, 1954, pp. 49–50.
[3] *Soviet News*, 23 September 1954.

then captured it from the Germans and published it.[1] It tells us that the total turnover planned for the Northern Sea Route in 1941 was 240,000 tons. This figure is considerably lower than the total for several years before the war, but it must be remembered that the plan was drawn up in the knowledge that the war was on and that the Kara Sea traffic would presumably be much reduced. If this is taken into account it will be seen that the volume of traffic in the other sectors was to be not less than in previous years. It is doubtful if the plan was fulfilled, since it is scarcely likely that the Russians who drew it up early in 1941 made allowance for being in the war themselves by the summer; and the German attack must have dislocated things seriously.

This piece of information does make one thing quite clear: the route cannot possibly at that time have been a paying proposition, or anywhere near it. The overhead expenses were very great. It would have been possible to recover them only if the turnover were high. With a turnover of 240,000 tons the freight charges would have had to be quite prohibitive. But if the route did not pay then, this does not prove that the Soviet Government did not ever intend to make it pay. While we must allow that strategic motives may have played a part, it is also possible that there was a long-term intention to run the route on an economic basis. The figures for subsequent years would tell us something, but we do not have them.

Almost all that we know about the working of the Northern Sea Route during and after the war comes from sources outside the Soviet Union. One thing we know for certain is that the route was used to bring Lend-lease supplies to the Soviet Union from the United States. While most of these supplies came to Murmansk, or Vladivostok, or across Persia, a steady trickle of twenty or thirty ships each summer sailed up the American west coast, through Bering Strait and along the north Siberian shore. This route was used for four seasons, from 1942 to 1945, and the total tonnage of goods transported was not far short of half a million. The ships were all entirely Soviet-manned, because in this way they might expect, as neutrals, to avoid attack by the Japanese. The destinations of most of the ships were ports east of Mys Chelyuskina, though some went on to the Kara Sea and even to Arkhangel'sk and Murmansk. Many had been chartered for a number of seasons before the war by Glavsevmorput' and had therefore been in these waters before, but some were American-built Liberty ships, themselves Lend-lease goods. These were bigger than any of the freighters used up to that time on the Northern Sea Route, and it is interesting that they were apparently successful and were not unduly troubled by the shoals which in places extend far from the coast. We know no details of these voyages; only that there seem to have been no disasters, since the Soviet Government sent a general acknowledgment that "everything had arrived." What we do know comes from the manifests of the ships, drawn up before they left the United States. And from these it seems clear that most of the goods brought in to the north Siberian ports were maintenance stores for Arctic undertakings. Food and fuel were the main commodities, followed by much smaller quantities of such items as airfield equipment, industrial plant and trucks. As far as one can tell this route was not used to bring in supplies destined for the front or for the large industrial centres. This tends to confirm the impression we have of pre-war operations: that they were concerned mainly with making the route usable and were not yet of special significance in the economic life of the country. But we must remember

[1] 'Gosudarstvennyy plan razvitiya narodnogo khozyaystva SSSR na 1941 god' [State plan for the development of the economy of the USSR in 1941]. Reprinted as *American Council of Learned Societies Reprints. Russian* Series, No. 30, [1951].

that we have only seen one side of the picture: goods coming in from the United States. We have no reliable information about what Soviet ships may have brought out of the Arctic.

What about the shooting war? These distant waters were never a major theatre of naval operations, but a number of actions were fought here between Soviet convoys and German U-boats. Once again the picture we have is one-sided. Soviet accounts mention only the loss of a survey vessel, a tug and two barges, and record the fact that Dikson, the wireless station and base at the mouth of the Yenisey, was bombarded. Much more than this went on, as we shall see. But the only accounts we have [1] come from a German naval source, so there may be some exaggeration in the other direction.

The German naval effort in the Arctic was directed mainly against Allied convoys to Murmansk and the White Sea, but shipping on the Northern Sea Route was also attacked. These operations were carried out chiefly by U-boats based in north Norway, aided by some air reconnaissance and, on one occasion, a surface ship. The first season for which attacks were planned was 1942. Reports of shipping at the western entrance of Matochkin Shar and off the coast of Novaya Zemlya brought a U-boat to the area. A merchant ship was torpedoed, a shore station bombarded and some barges carrying troops were sunk. (No doubt these last two were those referred to in the Soviet account.) Mines were laid off the entrance to the straits. Meanwhile, in August of 1942, an attack into the Kara Sea was made by the heavy cruiser *Admiral Scheer* and two U-boats. The Germans had had Japanese reports from Bering Strait that a particularly large Lend-lease convoy was coming through. The cruiser and the U-boats entered the Kara Sea by rounding the northern tip of Novaya Zemlya; all the other entrances were either mined or continuously observed. Another U-boat had to remain north of Novaya Zemlya to patrol the ice edge to the north; obviously they could not risk the only exit being blocked by ice. The *Admiral Scheer* spent twelve days in the Kara Sea, but she was not able to do much damage. Dikson was bombarded, as the Russians admit, but bad visibility and ice hampered movement. Little Soviet shipping was seen. The auxiliary icebreaker *Sibiryakov* was sunk in the eastern part of the Kara Sea, and a tanker in the anchorage at Dikson. Clearly all traffic had been ordered to put inshore as soon as it was realized a German warship was about; the Russians knew she would not dare remain long because of the ice risk.

The next year, 1943, there were more U-boats available. A bold step was planned: to set up advanced bases actually in Soviet territory. The area chosen was the northern part of Novaya Zemlya, and one site was selected on the west coast and two on the east. It is not quite clear if a shore base was actually established. Generally U-boats carried the necessary supplies. When at the base, they would lie on the bottom, half-submerged. The conning tower would be camouflaged with mats, sometimes so effectively that even their own aircraft could not find them. They were never disturbed by the Russians, despite considerable radio traffic. Flying boats operated from these bases for six weeks, but without very much success. Owing to bad weather and mechanical trouble only eight sorties were made and no ships were sighted. But the U-boats (there were between three and six operating) had some successes. The survey vessel, which the Russians admit losing, was sunk in the Kara Sea when it was uncomfortably close to the German advanced bases, three ships were sunk in the same sea east of Dikson, and an escort vessel was torpedoed off the west coast of Novaya Zemlya. The Russians were again holding up their

[1] *Polar Rec.* 6, 46 (1953) 822–26; *Marine Rundschau* 1 (1955) 1–8.

shipping east of Mys Chelyuskina in the hope that the Germans would be forced by the threat of the ice to retire. At the end of September a convoy was permitted to come on from the Laptev Sea, and this the U-boats caught, after many weeks of lying in wait. An escort vessel and four or five merchant ships were sunk. The U-boats did not finally withdraw until early November.

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the Germans, who were occupying the Greek islands lying off the coast of Asia Minor, was the most exciting part. It is mentioned in 'No stars to guide,' an attractive book by a British naval officer, Adrian Seligman, who was engineering the escape of another ship by the same route at the same time. The British officer taking the *Mikoyan* through found her crew extremely efficient and the navigation equipment first class. Later, she and the *Stalin* both went to the United States for repairs. The British-built *Sibiryakov* was sunk, and possibly the *Malygin* too; both names have been given to two of the ex-Finnish icebreakers. The old *Yermak* spent the war at Leningrad, from which she could not escape. But she survived. In 1949—her fiftieth birthday—she was awarded the Order of Lenin, and in 1953 she was reported as patrolling the Kara Sea. The *Litke*, another veteran built at Barrow in 1909, was active on the Northern Sea Route in 1954. The Soviet icebreaker

fleet is therefore still by far the largest in the world, even if we do not know its exact size.

So much for our knowledge of war-time activities. It is not a great deal, consisting largely of what the Americans knew about Lend-lease convoys and what the Germans knew about naval operations in the Kara Sea. The Russians certainly did much more than either of these accounts tell about. We may surmise that there was a good deal of Soviet coastal shipping, for the polar stations, mining settlements and trading posts had to be kept supplied (Lend-lease ships called only at the principal ports and anchorages, and from these supplies had to be distributed); possibly the

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[1] *Pravda*, 4 March 1945.
[2] *Polar Rec.* 6, 46 (1953) 826–29.

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In 1944 there were again about six U-boats operating in the Kara Sea. They sank several escort vessels and two merchant ships in a number of actions. The Germans knew that the Soviet ships were once again being held in the Laptev Sea, probably at Nordvik on the estuary of the Khatanga, and made a bold attempt to pass through the narrow and often ice-filled strait off Mys Chelyuskina—Proliv Vil'kitskogo—in order to reach them. But the ice in the strait defeated them. At the end of the season one U-boat landed a party which surprised the Soviet weather station at Mys Sterlegova, on the mainland east of Dikson. Bad weather forced the attackers to remain on shore for three days; but they were able to continue the radio traffic on the Soviet net without arousing any suspicion. This raid put the Germans in possession of some interesting information on how the Soviet weather stations were organized.

During the three seasons' operations U-boats claimed to have sunk eleven or twelve merchant ships totalling 42,000 gross registered tons, one destroyer, five escort vessels, a tug and some barges, and to have bombarded a number of shore stations and laid a great many mines. This was done for the loss of two U-boats. The German reports suggest that the Russians had not expected to be attacked in the Kara Sea at all. The counter measures the Russians took became increasingly effective year by year, but nevertheless the losses seem to have been quite considerable. The effect of the ice was interesting. No U-boat appears to have been badly damaged, though there were cases of bent periscopes and curiously inaccurate torpedoes. The latter were thought to have been damaged by earlier shocks in the ice, or by low temperatures, or possibly their acoustic direction-finding gear may have been affected by echoes from ice. In general the ice probably helped rather than hindered the U-boats, because it concentrated the Soviet convoys into narrow waters.

The Soviet icebreaker fleet seems to have survived the war almost intact. The *Stalin* class ships had various adventures. One, the *Anastas Mikoyan*, got out of the Black Sea (where she had just been completed), across the Mediterranean, the Red Sea and thence to the Arctic. The crossing of the Aegean under the noses of the Germans, who were occupying the Greek islands lying off the coast of Asia Minor, was the most exciting part. It is mentioned in 'No stars to guide,' an attractive book by a British naval officer, Adrian Seligman, who was engineering the escape of another ship by the same route at the same time. The British officer taking the *Mikoyan* through found her crew extremely efficient and the navigation equipment first class. Later, she and the *Stalin* both went to the United States for repairs. The British-built *Sibiryakov* was sunk, and possibly the *Malygin* too; both names have been given to two of the ex-Finnish icebreakers. The old *Yermak* spent the war at Leningrad, from which she could not escape. But she survived. In 1949—her fiftieth birthday—she was awarded the Order of Lenin, and in 1953 she was reported as patrolling the Kara Sea. The *Litke*, another veteran built at Barrow in 1909, was active on the Northern Sea Route in 1954. The Soviet icebreaker

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After the end of the war we have even less information on what has been happening. There is only one branch of activity about which we do know something fairly solid [2]: the Kara Sea timber traffic. This information is available because many foreign vessels, including British, have been working on this route since the war. Apart from one British ship which went to Igarka in 1947, the traffic did not start again until 1949. In that year at least eight ships called there. In 1950 there were not less than fifteen, and the number has steadily risen to twenty-six in 1954. So it may fairly be said that traffic on this part of the route has revived; although the number of ships employed and the amount of timber exported are still about half what they were in the years just before the war. These figures, however, account only for traffic to non-Soviet ports, and in most cases carried in non-Soviet ships. So it may be greater. But it is unlikely, on the whole, that there will have been much carried by Soviet ships. When the Soviet Government sells the timber it arranges the transport as well, and in all the post-war seasons it has chartered a number of foreign ships—which seems to indicate that Soviet ships are not abundantly at its disposal. And also, in the pre-war years the largest buyer of this timber was almost always the United Kingdom; if the past is any guide therefore the total trade now will not greatly exceed the present United Kingdom purchase, which fills nearly all the ships that we know have come from Igarka.

These foreign timber ships have all used the same route to and from Igarka. They call first at Murmansk, where they pick up two Soviet pilots for the Kara Sea. When they call here, the ships are also "controlled," a process which includes putting a seal on all binoculars and cameras; the binoculars are unsealed when the port is cleared, but the cameras remain locked up until the ship leaves Murmansk on her homeward passage a month later. The ships pass through Karskiye Vorota (the Kara straits), steam north-east to Ostrov Belyy, round it on the north side and make for Ostrov Diksona, which they pass as they enter the Yenisey. At its mouth two river pilots come aboard and they take the vessel the 400 miles upstream to Igarka. The return trip is just the same process in reverse. All the ships are on

[1] *Pravda*, 4 March 1945.
[2] *Polar Rec.* 6, 46 (1953) 826–29.

charter to the Soviet authorities, and as each passes the meridian of Murmansk she comes under the command of the Chief of Kara Sea Staff. He has the job of keeping the ships clear of ice. His Government is paying part of the insurance premiums for them, but this does not prevent him from keeping the ships as far away from ice as he can. And in fact he has been very successful, for no ship seems to have had difficulty since the war. It is true three at least have gone aground and one—the *Beckenham* in 1953—struck a reef and became a total loss. These mishaps have no doubt affected the insurance premiums, but none have in fact been due to ice.

Whether the partial revival of the Kara Sea traffic reflects what is happening on the rest of the route it is difficult to say. There is no particular reason why it should, because use of this leg of the route depends much more on Soviet foreign trade policy than on policy towards Arctic development. Let us see what Soviet sources can tell us.

The main piece of published news [1] about the Northern Sea Route to appear since the war was the story of a voyage which took place in August and September 1949. It was necessary to provide the river fleets of the Ob' and Yenisey with new powered craft and barges. These apparently had to be built on the Volga, and the only way of getting them to their destinations by water was to send them by way of the Arctic.

After a careful check the convoy left Arkhangel'sk, each ship towing several barges. No icebreaker escort was to be provided, but a tanker came with them. They waited at the straits leading to the Kara Sea until the ice further on was reported favourable. When this report was received, they all set out into the Kara Sea. Two days out, the wind changed, and the unprotected ships found themselves in fog and surrounded by ice. They drifted for fifteen hours, and then successfully extricated themselves. After this there was a storm which forced them to shelter in the seldom-used Proliv Malygina between Ostrov Belyy and the mainland. Ordinary ships cannot navigate this strait with any safety because of the shallow water, but river craft, which draw very little, could afford to take the risk. A few days later they reached their destinations—Salekhard on the lower Ob' and Igarka on the Yenisey. It was indeed something of a feat to get these craft round in safety, and Stalin sent a congratulatory telegram (which perhaps accounts for the publicity given to the whole thing).

Apart from this narrative, there have been short news items. They mention, for instance, that certain icebreakers have been working in this or that area, or that ice reconnaissance patrols have been active. There has been important new construction of Diesel-electric icebreakers, referred to earlier. There have been reports in the foreign press [2] of the passage of naval vessels and troopships, but these are generally unsubstantiated. But in 1954 there has been a particularly copious—by previous standards—release of information. There was an announcement [3] that annual freight turnover had increased fourfold since 1940—presumably to somewhere between one and two million tons. This was couched in somewhat vague terms, but it was the Minister responsible who wrote it. There was another reference [4] to continuing traffic during this summer; and another report [5] of river vessels

[1] *Trud*, 14 September 1949; *Vokrug Sveta*, No. 7, 1950, pp. 39–42.

[2] For instance, *Chasovoy*, February 1951, p. 11; *Deutsche Soldaten Zeitung*, 15 January 1953, p. 5.

[3] *Pravda*, 22 June 1954, by Z. A. Shashkov.

[4] *Krasnaya Zvezda*, 18 May 1954, by P. A. Gordiyenko.

[5] TASS report on Moscow Radio, 1 September 1954.

using the route to reach the Siberian rivers—this time some went to the Lena as well as the Ob' and Yenisey.

But the most important of all is the story of the High Latitude Air Expedition of 1954. There has been plenty in the papers about this impressive undertaking, which set up two drifting stations on the sea ice of the Arctic Ocean and sent mobile parties of scientists over much of the central Arctic in aircraft. Two aspects of it concern us here. One is that the main stated object of the expedition was to find out about the water and ice circulation in order to improve ice forecasting for the Northern Sea Route. The other is that the reports on the expedition mention a number of airmen and scientists—I. P. Mazuruk, I. I. Cherevichnyy, M. A. Titlov, Ya. Ya. Gakkel', A. F. Treshnikov, P. A. Gordiyenko, V. G. Kanaki, A. D. Malkin and many others—who were in polar work a long time ago, in several cases more than twenty years. It is fair to assume that they have been doing it continuously, or they would not still be together. It would seem therefore that there has been no reduction in Glavsevmorput's activities despite the silence surrounding them.[1]

There is also information about changes in personnel and administration. The Head of Glavsevmorput' was at first the capable and intellectually brilliant Academician Otto Yul'yevich Shmidt, who did the pioneer work but left the job in 1939, having apparently survived the purge which followed the disastrous season of 1937. After him came Ivan Dmitriyevich Papanin, convivial, energetic, a very good Party man, and hero of the North Pole Drifting Expedition. He was succeeded in 1946 by A. A. Afanas'yev, a shipping and port expert. In 1950 came Major-General Kuznetsov of the Naval Air Force. And in 1954, or perhaps 1953, another sailor was appointed—Engineer Rear-Admiral Vasiliy Fedotovich Burkhanov, who first went to the Arctic in 1936 as a ship's engineer and has been with Glavsevmorput' ever since.[2]

Again, immediately after Stalin's death a number of Ministries were reorganized.[3] As a part of this process the Chief Administration of the Northern Sea Route (a Chief Administration ranks next below a Ministry) was merged with the Ministry of the Merchant Fleet and the Ministry of the River Fleet to form a single Ministry of the Merchant and River Fleet. The new Minister was Z. A. Shashkov, a man whose interests are believed to lie mainly with inland waterways. This change could be interpreted as implying a lessening of the importance of Glavsevmorput'. But equally well it might simply mean that Glavsevmorput' is not so important as the two Ministries; and this is nothing new because it has always been junior in rank to a Ministry. In any case, less than eighteen months later, it was announced [4] that the two Ministries were again separated: Shashkov became Minister of the River Fleet, and V. G. Bakayev Minister of the Merchant Fleet, with Glavsevmorput' under the wing of the latter. So we are back where we started.

This sort of information allows one to say one thing with certainty: that activities do continue on at least as big a scale as before. There is no question of the whole thing being dropped. But there is no detail to fill in. It may be that the Siberian rivers are being used more now and that certain economic undertakings near their lower reaches may be supported in this way and not by sea. This could, if true, reduce the usefulness of the sea route, but it could never take its place. If activities

[1] *Morskoy i Rechnoy Flot*, No. 9, 1954, pp. 1–4; *Vestnik Akademii Nauk SSSR*, No. 9 1954, pp. 10–16.

[2] *Ogonek*, No. 33, 1954, p. 22.

[3] *Pravda*, 16 March 1953.

[4] *Pravda*, 29 August 1954.

continue, techniques will have been improved. So that we may assume greater efficiency as a result of better forecasts of ice conditions, better traffic planning, probably some lengthening of the shipping season. The stage is certainly past when it was an "expedition" to send ships to northern Siberia; although the Northern Sea Route may not yet be quite a "normally working waterway" (as the Five Year Plans of just before and just after the war proclaimed that it was to become), it can be no more than a matter of routine for Soviet ships to go wherever they want along its length. That is undeniably a great achievement, and one which contrasts sharply with corresponding development in the western hemisphere. But it is also in a way a precarious one; for a very small climatic change could undo all the effort that has gone into it by making the ice conditions impossibly bad (and they are known to have been particularly favourable during the years of the Soviet experiment).

What of the motive? The secrecy which the Soviet Government has enforced since 1947 makes one suspicious. But if one suspects large-scale military activity, one may be exaggerating the importance of the strategic side; much purely economic information is kept secret. There is a strategic side, certainly; but it is also true that further development could make the Northern Sea Route useful economically to the Soviet Union.

DISCUSSION

Afternoon Meeting, 20 December 1954

Before the paper the PRESIDENT (General Sir JAMES MARSHALL-CORNWALL) said: This afternoon we are to hear a paper from Dr. Terence Armstrong, a Fellow of the Scott Polar Research Institute of the University of Cambridge. Dr. Armstrong was awarded the Society's Cuthbert Peek Grant in 1954 for researches in the Arctic. His subject is particularly interesting because so little is known by ordinary people about the region in question, on which Dr. Armstrong published in 1952 a Memoir entitled "The Northern Sea Route: Soviet exploitation of the North East Passage." The North East Passage is of interest to two countries: our own, and Soviet Russia. It now lies entirely in Russian territory, but in the reign of Queen Elizabeth I several expeditions were sent out by Her Majesty, who encouraged adventure as does our present Queen Elizabeth, and the navigator Richard Chancellor was sent to sea with what we would today regard as very small ships to find a North East Passage round about the north Siberian coast and so find a short cut to China. Even since those days it has been the ambition of mariners to explore the North East Passage round the north coast of Siberia. That was done during the last war and has been done since, and our friends the Russians have of late reconnoitred all the possibilities of that Passage. The subject is also of particular interest in view of the climatic fluctuations along those coasts and in the North Atlantic region of recent years. Professor Hans Ahlmann, now Swedish Ambassador in Oslo, has made research into this subject a special province and he has lectured to this Society more than once about it. In the Soviet Union itself a great deal of research and active field work is being carried out. We have no details of this, and we can only hope that it may not be long before we can hear from a Russian specialist in this field an account of the work being carried on by the Arctic Research Institute of Leningrad and other Soviet organizations.

Dr. Armstrong then read his paper

The PRESIDENT: After listening to a most interesting lecture from one who is an expert on the subject you will all realize what great possibilities the Northern Sea Route has both from the strategic and mercantile point of view. As geographers we are particularly interested in following up the physical changes, the fluctuations of the ice barrier and the movement of glaciers, etc. in the Arctic Circle. We hope that we may be able to cooperate in the future with our Russian friends in obtaining infor-

mation and following up the changes in that area which are of such interest to scientists the world over. We have with us Dr. Brian Roberts, Senior Research Fellow of the Scott Polar Research Institute to which the lecturer belongs, and would welcome a contribution to the discussion by him.

Dr. BRIAN ROBERTS: At the Scott Polar Research Institute we consider ourselves most fortunate to have Dr. Armstrong as a member of the staff. Until he joined us it was impossible for us to discover much about what was going on in connection with the tremendous Soviet activity in the Arctic. He has, however, kept us informed in a way which is remarkable considering the great difficulties there are in ascertaining what is actually taking place.

We in this country have a great deal to learn from this work and enterprise on the part of the Russians. There are lessons which we should be able to apply in the Antarctic where we have, admittedly, a very much smaller-scale operation to carry out in the Falkland Islands Dependencies. But the two problems are essentially similar, as are the most suitable methods of dealing with them.

The first lesson we have to learn from the Russians in the Arctic is the need for a close relationship between scientific research and practical needs. The problems connected with these remote areas are so numerous that very careful planning of priorities is essential. The Russians have learned that certain things should be done first: that it is necessary to have the best possible weather reports, ice reports and so on; improved charts and sailing directions; also they have learned that they need to give their first attention to problems of transport, supply and communication between their various outposts. We need in the Antarctic to apply the same principles. We need to bring down the heavy insurance rates on ships operating in such areas. That can only be done by paying attention to the problems of transport and approach.

The second lesson is this: Dr. Armstrong mentioned the team of expert polar technicians which the Soviet authorities have brought together and employed on this work, some for twenty or thirty years past. We need the same kind of continuity in the South. We need men who can return there again and again, men who can be assured of long-term employment, because only in that way can they make the most of their hard-won experience.

The PRESIDENT: We also have with us Commander Courtney, recently connected with the Naval Staff at the Admiralty. Perhaps he would add a word or two to the discussion?

Commander A. T. COURTNEY, R.N. (Retd.): We do not get nearly enough information in regard to this outstanding example of what can be done and is being done by the Russians in the far north, and I admire Dr. Armstrong's collection of information from the meagre material available. I liked Dr. Armstrong's description of Papanin as a "good Party man"; that is true in both senses of the word, and I met others on that northern sea route. We did not always admire Papanin during the war as an administrator, but as a courageous Russian seaman he was first-class. It is giving away no secret to say that he declared that the port of Archangel could be kept open with ease during the winter of 1941–42, and we all remember what a hard winter that was. I remember how impossible it was to keep Archangel open after January, and the fact that Papanin declared that he could keep the port open before he knew what the winter was likely to be shows the grave risk run up in the north by Soviet officials who are under strict political control from Moscow, which dictates decisions which are sometimes contrary to the actual facts.

The emphasis in Dr. Armstrong's interesting talk has been on the Northern Sea Route and on the economic aspect. As a professional sailor myself I am more concerned with the strategic aspect, and I still feel we should put more emphasis on the strategic side rather than on the economic. It seems to me that we in this country have made too little allowance for the appalling frustration which has overtaken the Russian sailors in particular and the Russian General Staff as a whole, ever since the 1860's when they started to develop their Far Eastern possessions at the end of a

tenuous and long line of railway communication. I do not think we realize what a bitter effect the impossibility of reinforcing their possessions through waters controlled by potentially hostile Powers has had on the Russian mental background in that respect. One of the main motives of the Northern Sea Route is that of providing facilities for reinforcing and supplying the Far East over a sea route which never runs out of sight of the Soviet coast-line.

The lecture has included a great deal more than the Soviet Arctic as a whole, and in thinking of the strategic side it is a good thing to remember that there has recently been agreed between the Canadian and American Governments the installation and planning of the DEW radar chain right through Alaska and round the edge of the Arctic Circle into Canada. We should make sufficient allowance for Soviet ingenuity and Soviet strategic ideas and not assume that nothing whatever goes on on the other side. I am always inclined to take that possibility into consideration when thinking of the chain of weather stations which we know in 1939 lay along the Arctic coast of Soviet Russia.

Finally, we should be generous in this particular field of Polar studies and say quite categorically that we consider that the Russians are streets ahead of us in the field of Polar exploration. The study and hard work which has gone to make a practical proposition of the Northern Sea Route deserves our greatest admiration and praise.

The PRESIDENT: The lecture has lifted a corner not only of the Iron Curtain but of the Ice Curtain which shuts out the area of the Northern Sea Route. In your name and my own I thank Dr. Armstrong warmly for his interesting lecture.

CAPE TOWN: A MULTI-RACIAL CITY

PETER SCOTT

EACH OF the three major South African cities has a different ethnic group dominant among its non-white, or non-European, population: in Johannesburg the African, in Cape Town the Cape Coloured, in Durban the Indian. Of these, Cape Town, the second largest and the parliamentary capital, presents probably the greatest admixture of ethnic distributions, due largely to the hybrid character and social aspirations of its Coloured community.[1] In 1951, the population of Greater Cape Town totalled 632,987, of whom 267,212 were returned as European, 249,098 as Cape Coloured, 59,893 as African, 48,547 as Cape Malay, and 8,237 as Asiatic. The present study, based on the detailed population returns [2] and on a house-to-house ethnic survey, seeks to determine the part played by ethnic factors in the social geography of this multi-racial city.

The urban pattern.—Cape Town's setting is justly famed for its beauty. The heart of the city lies in Table Valley overshadowed by the bold precipices of Table Mountain formed of jointed quartz sandstones.[3] It is sheltered from the south-easterlies of summer by the lofty Devil's Peak and from the north-westerlies of winter by the lower, elongated mountain of Lion's Head and Lion's Rump. Almost everywhere, physical features have moulded the urban pattern, which has spread from the relatively level land of Table Valley on to the raised beach at Sea Point and up the gentler, often talus-covered slopes from Fresnaye to Wynberg as far as the 500-foot contour.[4] Only the low-lying, sand-covered plain of the Cape Flats, connecting the peninsula with the mainland, has permitted untrammelled suburban sprawl. (For map, see Figure 1: Figs. 1–10 on folding sheet.)

Within this unique framework, Cape Town presents many structural features common to most cities. In Figure 2, generalized from a detailed survey plotted on a scale of 1 : 12,500, the central business district may be seen enclosed on three sides by a belt of residential deterioration invaded by industry and street-corner shops.[5] Eastward lie the main industrial tracts of Paardon Eiland, Salt River and Ndabeni, located on level land along railways leading from the port inland. To house the growing numbers employed in industry, substantial recent extension of building has taken place to the east and south-east, engulfing earlier housing in a broken arc of modern estates extending from Brooklyn, through Pinelands, Q Town and Lansdowne, to Southfield and Bergvliet. West of this arc lie the more favoured residential areas, occupying higher, better drained sites and commanding extensive

[1] See Buchanan, Keith and N. Hurwitz. "The 'Coloured' Community in the Union of South Africa," *Geogr. Rev.* **40** (1950) 397–414.

[2] Kindly made available by the Town Planning Branch of the City Engineer's Department, Cape Town.

[3] See Haughton, S. H. "The Geology of Capetown and adjoining Country," *Geol. Surv. Mem., Pretoria,* 1933.

[4] For a geographical account of the city's growth, see Marshall, M. "The growth and development of Cape Town," Cape Town M.A. Thesis (unpublished, 1944). An excellent short account is given by W. J. Talbot in 'The Cape Peninsula' (ed. J. A. Mabbutt). Cape Town, 1952, pp. 144–76.

[5] For a detailed account of the functional topography of Cape Town, particularly of the central business district, see Scott, Peter. "Some Functional Aspects of Cape Town," *Econ. Geogr.* **30** (1954) 347–63.

coastal and mountain views. The continuity of this belt is broken by commercial sub-centres such as Mowbray, Rondebosch, Claremont and Wynberg, former outlying villages now engorged in suburbia. Segments of the belt are also discernible on the slopes of Devil's Peak, Table Valley and Sea Point.

Residential areas fall naturally into districts clearly defined by the age, density and style of housing (Fig. 3). In a field survey carried out in 1952, borderline cases difficult to classify by these criteria were resolved by reference to market value: high-grade housing was placed at over £5000 sterling, medium-grade housing at £5000–£2000, and low-grade housing at less than £2000. The division between old and new housing was defined architecturally at 1910, but almost all new districts date since 1930. Few houses were built between 1903 and 1930, owing to overconstruction in the Boer War boom and the post-Boer War exodus of population inland (Fig. 13).

In Figure 3, the zones of low-grade housing, which surround the city core, the industrial tracts, and the commercial sub-centres, correspond closely to the areas occupied by terraces and semi-detached houses on the land use map. At Sea Point and in Table Valley, medium- and high-grade residences form successive belts outward from the centre, but south of Mowbray the pattern manifests not only a close adjustment to the conditions of site but also the influence of historical factors and the accidents of land ownership. Medium-grade housing, formerly confined to more favourable terrain, has latterly spread on to the Cape Flats at Pinelands, a garden city founded by private initiative in 1920, and southward along the railway at Plumstead, Southfield and Bergvliet. North of Pinelands lies the shanty town of Windermere, where an attempt is being made to replace *pondokkies*—hovels built of wattle and daub, or wood and hessian, or paraffin cans and corrugated iron—by semi-detached houses leased at sub-economic rentals. South-east of Pinelands lies the municipal African township of Langa, dating from 1923, and further south, more sub-economic housing, notably at Q Town. Beyond the urban fringe are large numbers of squatters living in pondokkies in the bush.[1] In marked contrast are the long-established districts of high-class residences, confined to Wynberg Hill, formerly an aristocratic Anglo-Indian locality, to Kenilworth, and to the Camp Ground road area south-west of Rondebosch Common. Nearby are most of the newer high-grade districts, but outliers occur at Oranjezicht and Fresnaye.

Ethnic areas.—The physical character of residential districts is, however, less important socially and politically than their ethnic character.[2] In South Africa census statistics have often been used to determine the location of ethnic quarters,[3] but in detailed analysis this method fails, partly because of the inaccurate returns made by some individuals for social or political gain, partly because boundaries of census tracts are rarely conterminous with ethnic boundaries, and partly because areas having European residents only may yet contain non-Europeans employed as domestic servants and occasionally as caretakers. Accordingly, to establish the precise ethnic character of residential areas, a house-to-house survey was organized by the author and undertaken by a team of voluntary workers, mostly non-European teachers and postmen, between July 1950 and June 1952. Field sheets, plotted on

[1] See "Report of a Committee of Enquiry appointed to enquire into conditions existing on the Cape Flats and similarly-affected areas in the Cape Division, 1942," U.G. No. 18, Pretoria, 1945.

[2] This was not so a century ago, when income group was more significant socially than ethnic group.

[3] See, for example, Batson, E. "Notes on the Distribution and Density of Population in Cape Town, 1936," *Trans. Roy. Soc. S. Africa*, 31 (1947) 389–420; reference on p. 420.

a scale of 1 : 6250 for the more complex areas or 1 : 12,500 elsewhere, were checked independently wherever possible. Figure 4 summarizes the emergent pattern.

Perhaps its most striking feature is the sharpness of the divide between most European and non-European areas: intermingling is confined to a few restricted tracts. In general, Europeans are to be found in Sea Point, Table Valley and from Observatory southward; non-Europeans are located north-west and east of the centre, on the Cape Flats, and surrounding the commercial sub-centres. But even so, there are many concentrations of Europeans on the Cape Flats and many concentrations of non-Europeans west of the Flats. For example, obsolescent terraced housing in upper Newlands, built nearly a century ago for Irish immigrants employed in the local brewery, is now almost wholly inhabited by Coloureds. It is

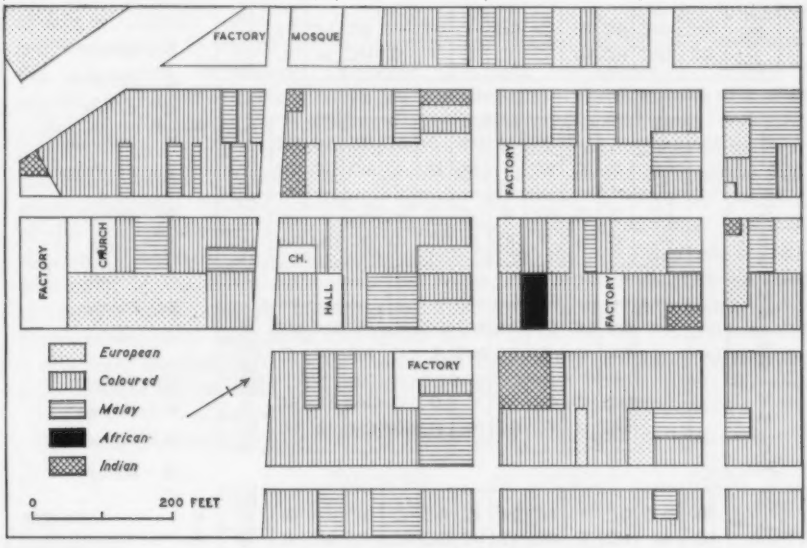


Fig. 11. A tract of Salt River

noteworthy, however, that this Coloured quarter, like most ethnic quarters, is compact and well defined.

Where the cleavage between European and non-European districts was not sharp, evidence usually existed of Coloured infiltration into areas formerly European, as in parts of Salt River, but there were also cases, as in parts of Diep River, where Europeans were encroaching on areas formerly Coloured. Figure 11 depicts a tract of Salt River, where decayed terraces, formerly occupied wholly by Europeans, have been invaded by small factories, neighbourhood shops, and Cape Coloureds. It is symptomatic that the degree of ethnic admixture is not great. Most terraces are occupied either predominantly by Europeans or predominantly by Coloureds. It would seem that as soon as Coloureds gain a foothold in a street Europeans evacuate in the mass.

This is not to say, however, that areas classified as Cape Coloured lack ethnic complexity. Figure 12 shows a municipal housing estate at Diep River, where semi-detached houses are leased at sub-economic rentals to non-Europeans, supposedly

Cape Coloureds. A row of pre-existing housing is included on the south. Racial characteristics are given within plot boundaries: the upper lettering refers to the tenant and the lower to his wife. Where an individual is described by more than one symbol, this denotes a known or easily recognizable crossing between two strains, the dominant being given first. It is significant that even within this small tract there are numerous examples of miscegenation. Moreover, although thirteen Malays are included, only two families are Mohammedan, both in the row of older housing; the rest are indistinguishable, socially and religiously, from Coloureds.

It is not surprising that discrepancies were found to exist between the ethnic survey and the census returns. Cape Malays, for example, were found to be less numerous than the census returns would suggest. Moreover, in several areas near

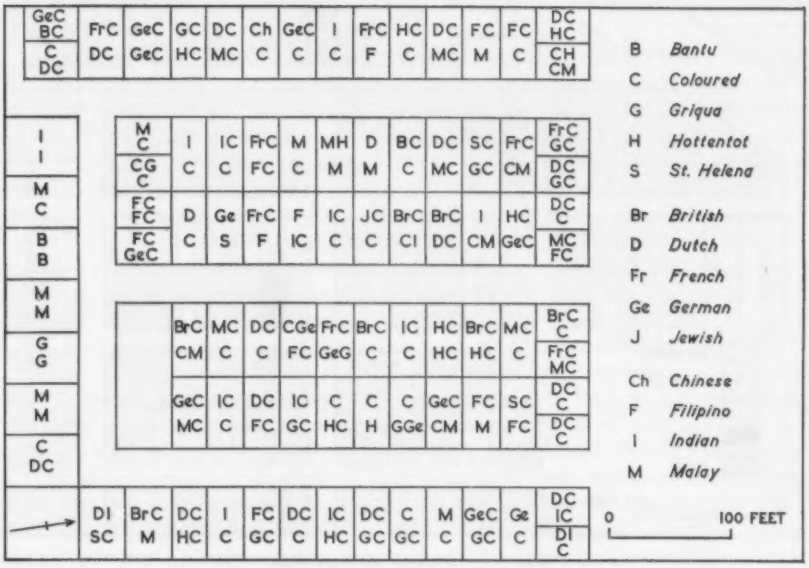


Fig. 12. A tract of Diep River

the centre, where the census gave a predominance of Europeans, the survey revealed a predominance of Coloureds (inset to Fig. 4). Since these areas are situated mainly on the margins of European districts and were surveyed only a few months after the census was held, they would appear to contain Coloureds who "pass for white," at least in census returns.

Cape Malays,[1] a relatively homogeneous Mohammedan group sometimes described as the aristocracy of the Cape Coloured, were found to be clustered around mosques in well-defined districts, of which the Malay Quarter on the slopes of Signal Hill is perhaps the largest and certainly the best known. Formerly a European district for the well to do, the Malay Quarter displays some fine examples of the once dignified, now dilapidated, flat-roofed town houses of the early nineteenth century. Although some of the finer examples are being restored, much of the Malay Quarter remains as slum; the provision of municipal flats in recent years

[1] See du Plessis, I. D. 'The Cape Malays.' Cape Town, 1944.

has done little more than accommodate the natural increase in population. Other distinctive Malay areas are located near Claremont station, in the Landsdowne Road area of Claremont, and at Wittebome, while less compact areas are distinguishable in District Six, Salt River and Wynberg. Curiously, all are areas of late nineteenth century terraces. The mosques at Diep River, Kensington, and Grassy Park have not attracted large concentrations. In addition, there are several thousand Malays, all Mohammedan but socially and economically indistinguishable from Coloureds, dispersed throughout the Coloured areas, though mainly in the older districts. The scale of Figure 4 did not permit their inclusion.

Africans are supposed to reside only at Langa, but owing to the failure of building construction to keep pace with the accelerated urbanization of Africans since the war, more than four-fifths of the African population live outside the township, mostly in Coloured areas. The majority are squatters at Windermere, Crawford and Lansdowne, but some live in overcrowded, obsolescent housing in District Six, Claremont, Wittebome, Plumstead, Steurhof and elsewhere. Substantial numbers also dwell in the bush to the south of the area surveyed, notably at Retreat.

Residential conditions.—Correlation of ethnic areas, census returns and residential districts yielded a quantitative comparison of the housing conditions of Europeans and non-Europeans. It was found that non-Europeans are absent from the high-grade residential districts, except as resident employees, but number one-tenth of the total population of the new medium-grade districts, one-fifth in the old medium-grade districts, and four-fifths in both the old and new low-grade districts. Moreover, of the European population, one-tenth enjoys high-grade housing, three-fifths medium-grade housing, and three-tenths low-grade housing, but of the non-Europeans more than nine-tenths are living in the low-grade areas; only a privileged handful live in better houses, and then mainly at the cost of considerable personal sacrifice and chronic overcrowding.

The percentage distribution of population by residential districts, 1951

	High-grade		*Medium-grade*		*Low-grade*	
	Old	*New*	*Old*	*New*	*Old*	*New*
Europeans	3·5	7·1	25·4	35·2	14·3	14·5
Non-Europeans	..	..	5·1	3·0	45·0	46·9
All races	1·7	3·4	14·1	17·1	32·4	31·3

Correlation of ethnic areas and census returns also furnished a social and economic index to European residential districts by establishing the ratio of non-Europeans, presumably domestic servants, to Europeans in areas having only European residents (Fig. 5).[1] As expected, the ratio of domestic servants to European residents increases outwards from the centre. All low-grade districts, whether old or new, have ratios of less than 10 per cent., almost all medium-grade districts have ratios between 10 and 20, and most high-grade districts have ratios greater than 20. So far, however, the pattern merely confirms the definition of residential districts.

Yet the new high-class residential areas provide some instructive contrasts. Whereas Fresnaye and Oranjezicht have ratios of 32 and 36 respectively, upper Pinelands and Rondebosch bear an average of only 20. This reflects not only the degree of relative dependence on daily and resident help but also difference in

[1] Allowance was made for hospitals, mental asylums, and similar institutions.

social status. Moreover, fashionable Wynberg Hill, almost as close to sources of daily help as Rondebosch, carries an average ratio of 43, in one area even 55. By contrast, the two old high-class districts of Rondebosch and Wynberg-Kenilworth support ratios of 24 and 27 respectively. The average ratio for the new high-class areas is 24 and for the old 26.

Even the poorer localities exhibit significant variations. Thus for the new middle-class areas the ratio gradually decreases from 17 at Sea Point to 14 in Table Valley, 12 at Pinelands and Mowbray, 11 at Claremont, 10 at Plumstead and 9 at Southfield —a reflection both of increasing dependence on daily help and decreasing social status southward in the peninsula. In general, the old middle-class districts display a comparable, though less consistent, decline southward. But in the old lower-class districts, the reverse holds true, suggesting an improvement in social and economic status outward from the centre. The average ratios for the old and new middle-class districts is 13 and 15 respectively and for the lower-class districts 9 and 4 respectively.

A further index to residential conditions, this time mainly of non-European low-grade housing, springs from the incidence of infant mortality, illegitimate births, and tuberculosis mortality. Of these, tuberculosis mortality is perhaps the most expressive (Fig. 6).[1] For the period 1936–46,[2] the mean annual tuberculosis death rate for all races was 303 per 100,000—73 for Europeans and no less than 530 for non-Europeans. Although not as high as the rates for other South African coastal cities, notably Port Elizabeth, these figures may yet be compared with 340 for Singapore during the worst year of Japanese occupation,[3] 135 for war-shattered Warsaw in 1946,[4] 110 for Liverpool, the worst city in Britain, and 70 for Toronto, Canada's worst city.

Even the European death rate, low as it is by comparison with the non-European, would be considered as epidemic for a comparable income-group in Europe or North America;[5] it is undoubtedly due to contact between white and non-white. The European rate ranges from 176 and 160 in the ethnically mixed areas of Woodstock and Salt River respectively to 47 and 46 in the favoured residential districts of Fresnaye and Rondebosch. But whereas only two European districts have rates exceeding 150, none of the non-European districts has a rate of less than 300. Nor is there any marked difference between the old congested slums (437–527) and the new, more spacious suburbs (381–531). The highest incidence of all occurs in the Malay Quarter (670), in parts of Salt River (626) and at Windermere (969). The deplorable position at Windermere reflects the presence of Africans, whose mean annual rate is 882 compared with 507 for Coloureds and only 151 for Asiatics. This gives some measure of the relative economic status of the ethnic groups.

Indian shops.—The Indian community, virtually synonymous with the group designated "Asiatic" in the census, is the one element in the multi-racial population of Cape Town which has not congregated to form ethnic quarters. Although the living standards of the Indian community are in general much superior to those of

[1] Space does not permit a fuller treatment of vital statistics.

[2] The longest recent period for which statistics are available, owing to a revision of statistical boundaries in 1946. Statistics are from the annual reports of the Medical Officer of Health, Cape Town.

[3] *Cape Times*, July 9, 1949, p. 3.

[4] Davidson, B. 'Report on Southern Africa.' Londo 1952, p. 127.

[5] Although the mean annual tuberculosis death rate for London is about 64 per 100,000, the rate among those with incomes exceeding £350 per annum is only about 3. See Davidson, *op. cit.*, p. 194.

any other non-European group, there is yet a higher proportion of Indians than Coloureds living in the poorer districts. Such facts are attributable to the economic role of the Indian as small-scale trader and dealer.[1] Nearly 94 per cent. of the Indian residences located in the survey were shops (Fig. 7). The majority were street-corner shops, but small clusters were found in the poorer sections of commercial sub-centres, such as Claremont and Wynberg, and there is an outstanding concentration in Harrington Street, District Six. Of the 980 Indian shops recorded, no less than 413, or 42 per cent., are crowded between the centre and Observatory, evidence of the maladjustment in the distribution of services between the older, inner zone and the extensive, newer areas.

The distribution of Indian shops appear to be influenced more by the standards of living in the areas served than by ethnic considerations. No less than 938 shops,

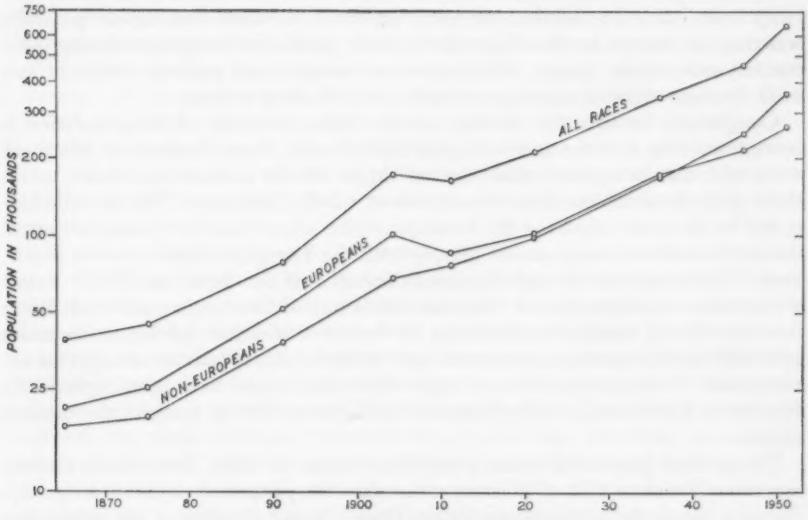


Fig. 13. Population growth

or nearly 97 per cent., were found in low-grade residential localities, but only 820, or 85 per cent., in non-European areas. There is also an interesting division between old and new districts: 717 and 221 respectively for low-grade housing, 14 and 25 for medium-grade, and 1 and 2 for high-grade housing, giving totals of 732 and 248 respectively.[2]

Growth and distribution of population.—South African census returns cannot provide a clear picture of population growth by ethnic group. The criteria used have not only been inadequately defined and difficult to apply but have varied from one census to another. Even the two most recent censuses have differed in that Cape Malays were included with Coloureds in 1946 but specified in 1951. Consequently, the growth of population in Greater Cape Town since 1865, when the first census was taken, can be shown only by Europeans and non-Europeans, a division

[1] See Buchanan, Keith and N. Hurwitz. "The Asiatic Immigrant Community in the Union of South Africa," *Geogr. Rev.* **39** (1949) 440–49.

[2] The number of Indian shops in the density categories shown in Figure 8 are, in descending order of density, 252, 130, 134, 225, 170 and 69 respectively.

at least significant politically (Fig. 13). Logarithmic analysis indicates that in 1938 non-Europeans outnumbered Europeans for the first time in Cape Town's history and that since then non-Europeans have been increasing at a substantially greater rate than Europeans. Such facts underlie contemporary South African politics.

The general pattern of population distribution in Cape Town differs little from that in Western cities. Figure 8 shows residential densities in 1951 for each of the 427 census tracts; boundaries between tracts with similar densities have been omitted. Since the central business district contains so little residential land that, despite a relatively low overall density, a relatively high residential density prevails, the centre has been excluded for fear of misleading. Adjoining the business centre are the chronically congested areas, where, in general, residential densities, even of single- and double-storeyed dwellings, exceed 100 per acre and, in District Six and parts of Salt River, even 200. Beyond lies an intermediate zone, where densities range from 100 to 50, and then the suburban outskirts, where densities are generally less than 50, except for the older, more closely packed housing surrounding commercial sub-centres. Langa, with its pre-war barracks and post-war blocks of flats built for male African migrants, presents an anomalous feature.

Comparison between the density and the ethnic character of the population is more rewarding near the centre than in the suburbs. From Fresnaye to Mowbray areas with densities greater than 100 are almost wholly Coloured or Malay, while those with densities less than 100 are almost wholly European. This is well illustrated by the areas adjoining the business centre, where non-European districts to the north-west and east contrast sharply with the European districts to the south-west. The comparatively high European densities of Sea Point and Table Valley stem from a concentration of flats and hotels and of Observatory and Salt River from low living standards. Similarly, in the outer districts the higher densities generally denote non-European areas and the lower European, but exceptions are numerous. European densities are high where old houses have been replaced by flats, as in Rondebosch, while Coloured densities are low in many of the modern estates.

The general pattern of recent population change in Cape Town bears slightly less resemblance to that of Western cities than the pattern of population density. Figure 9 shows the extent of population change in 148 divisions of the urban area during the period 1936–51; most of these divisions represent groupings of census tracts made necessary by boundary revisions in inter-censal periods. Although the outward drift of population is readily apparent, the progressive deterioration of buildings near the centre and the invasion of these areas by warehouses and factories have been accompanied by far less exodus than the conditions would justify or might lead one to expect. Coloured quarters of District Six, Woodstock and Salt River, which carry some of the highest densities in Cape Town, have undergone substantial increases in population, despite considerable industrialization. The ethnically mixed area of dilapidated terraced housing shown in Figure 11 is a case in point. In the fifteen-year period, the European population of this tract of Salt River decreased by 32 per cent, but in spite of the appropriation of houses for small workshops, the Coloured (including Malay) population increased by 42 per cent. and the Indian population multiplied some fourfold. These increases cannot be explained, as some similar increases elsewhere in Cape Town may be explained in part, by the substitution of flats for slum housing. It is in fact significant that those areas near the centre which have experienced an overall decline in population contain mostly Europeans. Otherwise, the pattern of population change resembles that

of western cities with an intermediate zone, where population growth appears to be slowing down, and an outer zone, where population growth is rapid. The pattern is modified, however, by the peculiarities of site, for the outer zone is absent from Sea Point and Table Valley, except for Vredehoek, where the urban frontier has advanced steeply uphill and numerous blocks of flats have been built. This zone is also broken by Wynberg, where old residential districts reveal a slowing down in population growth.

But changes in total population mask the politically more important changes in ethnic composition. Although in some parts of the inner zone decreases in total population were recorded and in others increases, almost everywhere there was a decrease in Europeans and an increase in non-Europeans (Fig. 10). Similar changes took place in the poorer quarter of Wynberg. Such areas are to be distinguished from outlying Kensington, Hazendal, Q Town and Athlone, where, owing to the establishment of non-European housing estates in areas formerly rural, the rate of European decrease has been far smaller and of non-European increase far greater.

While there is thus ample evidence that non-Europeans, predominantly Cape Coloured, are occupying areas formerly European, there is scant evidence of a reverse movement. Only five small areas, none of which was formerly non-European, have shown an increase in Europeans and a decrease in non-Europeans. Here the change may be attributed partly to the employment of fewer resident domestic servants and partly to the establishment of European housing in areas formerly rural.

The future.—This sequence of occupancy by ethnic groups, characteristic of South African urban areas especially during the forties and territorially in favour of non-Europeans, helps to explain why the principle of racial segregation, if not the present Apartheid policy, claims such wide support among white South Africans. Already the sequence has been brought under control, if not actually arrested, by the Group Areas Act of 1950, which permits each ethnic group to reside or own property only within specified areas. The enforcement of this Act will undoubtedly accelerate the trend towards residential segregation that has been increasingly evident this century with the growth of housing estates designed exclusively for European, or Cape Coloured, or African, or even Malay. But far more important in the long run may be the check it provides to the spread not merely of Coloureds into decayed European areas but of urban blight outwards from the core. For although the distribution of white and Coloured is perhaps comparable to that of wealthy and poor in a western city, it is accompanied by far greater contrasts in the density and growth of population and hence in standards of living and health. It thus remains to be seen whether a policy of crystallizing ethnic areas will help to alleviate urban blight or whether it will merely accentuate the already marked contrasts in residential conditions.

ACKNOWLEDGMENTS

I wish to record my gratitude to the many voluntary workers who so readily undertook the ethnic survey, particularly to Mr. K. Roberts, Principal of St. Luke's School, Diep River, for enthusiastic help throughout two exacting years. Field work was assisted by a grant from the University of Cape Town Staff Research Fund, and publication of the figures by a grant from the University of Tasmania Publications Funds.

MOORS AND CANARY ISLANDERS ON THE COAST OF THE WESTERN SAHARA

JEAN ROBIN

THE COASTAL WATERS of the western Sahara, between the 19th and 24th parallels, are among the richest in the world in fish. Their abundance was catalogued in the course of Professor Gruvel's [1] mission in 1905, and it has been the subject of subsequent research. In spite of a life remote from seafaring ways, the Moors or "Beydanes," the great camel-owning nomads of the region, have never been unaware of these resources; they have even been the issue at stake in frequent tribal squabbles. It is true that the ocean waters have never been exploited in person by the warriors of bedouin or "hassane" stock, the gun-bearing aristocrats, or by the holy men or "zwaya," the marabouts called by Islamic law to a life of prayer and study. Both these classes have, however, claimed suzerainty over the small fishing clans, of Berber or negroid origin, called "Imraguen" who have from time immemorial gathered the harvest of the coast. In addition, special mention should be made of the little tribe of Ahel Laghzel, an independent community which bears arms; these people fish for their own benefit certain stretches of the Baie du Lévrier.

Nowadays, the most important centres inhabited by the Imraguen fishers are, from south to north: Lemhayjerat, to the south of Cap Timiris (or Mirik), inhabited by the vassals of the Tendgha marabouts (Ahel Bouhoboyni); Memghar, in the immediate vicinity of Cap Mirik, inhabited by the former vassals of the warriors Oulad Seyid of the Trarza; R'Gueyba, at the tip of the Presqu'île de Thila, inhabited by the vassals of the Barikallah marabouts (Habiballah); several areas (N'Teychott, N'Tesseut, Ajouer, Foum el Trig, Iwik) in the zone of runnels and mud-holes lying between Cap Iwik and the southern tip of Île Tidra and Île Serenni, inhabited off and on by fishermen most of whom are vassals of the Oulad Bou Sba, a tribe claiming to be *chorfa* or descended from the Prophet; Arkeys, near Cap el Freh, Al Zas (at the cape of the same name) and Île d'Arguin, occupied temporarily by the vassals of the Barikallah marabouts (Habiballah). Finally, the shores of the Baie de l'Étoile, Baie du Cansado and Baie de l'Archimède, subdivisions of the great Baie du Lévrier, were and still sometimes are exploited on their own behalf by members of the Ahel Laghzel tribe; while those of Dakhla, in the bay of Villa Cisneros, are the customary fishing grounds of the Oulad Tidrarin, vassals of the famous warrior tribe of the Oulad Delim. The fresh water essential for the maintenance of these settlements is carried in water skins on pack camels from the nearest wells, which are often many kilometres away.

These same areas of the Baie du Lévrier and of the Banc d'Arguin, apart perhaps from a stretch between Cap el Freh and Cap Mirik which is more or less unnavigable, have been frequented for a long time past by fishing fleets from the Canary Islands, and particularly by the seafaring people of Lanzarote, Fuerteventura and Gran Canaria. For centuries, therefore, this Atlantic seaboard has been the meeting place of two peoples, two languages, two religions, two civilizations and finally of two quite distinct fishing techniques.

The technique of the Canary Island fishermen resembles closely methods used on

[1] Gruvel A., and R. Chudeau. 'A travers la Mauritanie occidentale de Saint Louis à Port Étienne.' Paris, Larose, 1909–11.

the Atlantic coasts of Europe. The most traditional method involves the use of big sailing ships, schooners, "dundees" and cutters (*balandros*), with smaller satellite boats or "lanchas," resembling the dories once familiar on the Newfoundland banks. The tackle may take the form either of ground lines or of great seine nets (*filets droits*),[1] of which the mesh varies according to the fish to be caught; it would be pointless here to go into more detail. The object is to catch with nets shoals of courbines, of bonitos, or of mullet—or, with the line, sargus and diagramma. These fish are brought by the smaller boats to the mother-ship, gutted and salted on board, and then taken to the Canaries. There they are dried and sold in the markets as courbines and bacalao.

The first known description of the time-honoured technique of the Imraguen is to be found in an account by the Portuguese traveller Valentim Fernandez (1506–7).[2] There is no question here of putting to sea, which is not surprising when one considers how totally bare of timber for boat-building, or for any other purposes, is the Sahara. Lieutenant Lotte made a special study of this fishing technique in "Coutûmes des Imraguen;"[3] so also did Lieutenant Revol in his "Étude sur les fractions d'Imraguen de la côte mauritanienne."[4] In spite of this more up-to-date information, the most ancient, the shortest and incidentally the most graphic account of the Imraguen fishermen, is well worth quoting:

> "The nets with which the 'schirmeyros' Azeneques catch fish are made from thread manufactured out of the roots of trees, that is to say from a bark which is peeled off, beaten and carefully processed, and finally spun into a thread. These nets are as much as a fathom wide and five long. They are attached to rods pointed at each end, as big as a staff. The floats of these nets are pieces of wood of *Figueyra do inferno*. The nets are weighted by balls of fired clay, dried in hot ashes and pierced. The men go two and two to fish, each carrying a net wrapped round his staff in the way I have described. When the moment comes, they tie their two nets together, and, as soon as they see the fish, they approach from either side, letting the net unroll gradually between them until they reach the shore. This takes place in the shallow water, hardly knee-deep, and at the time of day when the heat is at its height, because the fish are then, as it were, drugged by the warmth of the water, which is in harmony with that of the sun. They carry a harpoon in the right hand to spear the fish when, in trying to escape the net, it leaps in the air. It is thus that they fish."

The bark, here described as used in making the nets, is that of an *Asclepidacae* called *Leptadenia spartum* (or *titarek* in the vernacular) while the wood of which the floats are made is that of the *Euphorbia balsamifera* or *afernan*.

The Imraguen are above all interested in catching mullet, a fish of which both the flesh and the roe are especially prized by the Moors. This roe, which is marketed and eaten as botargo (poutargue) is carefully detached and put to dry in the

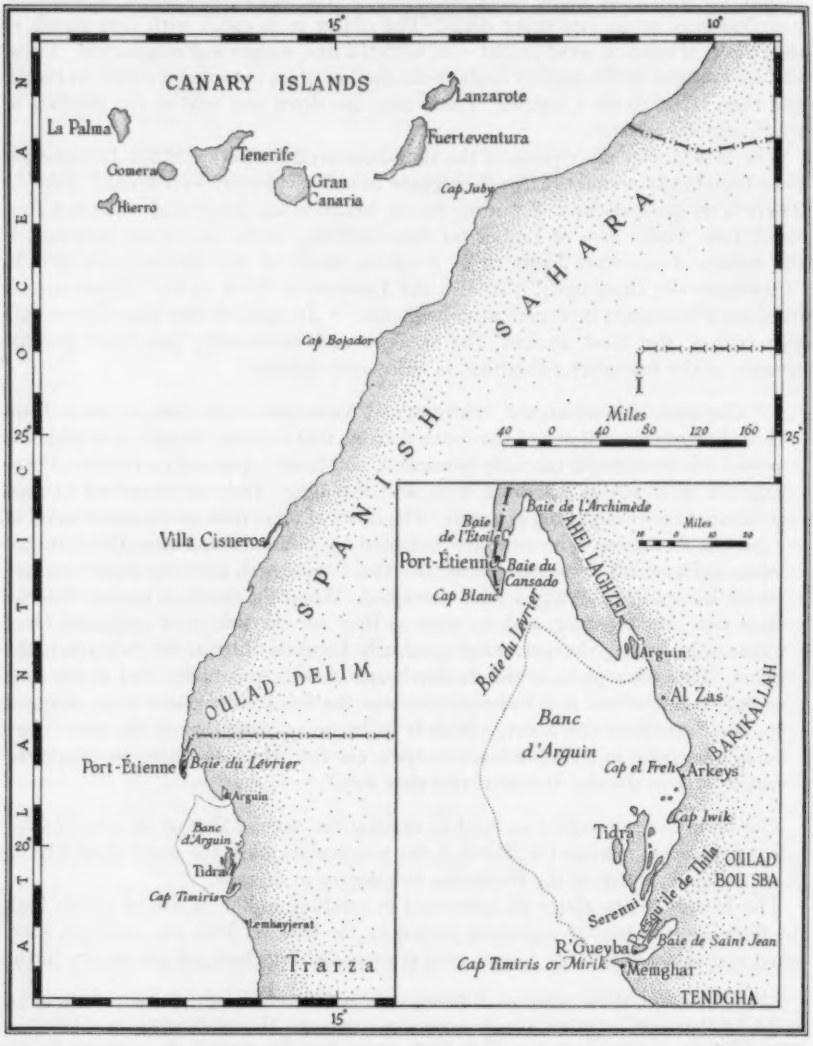
[1] The *filet droit* is the simplest of all fishing nets, and the following definition of it is given by Ed. Le Danois in 'Le grand livre de la mer et des poissons' (Union Européenne d'Éditions, 1953, Monaco, Tome II, p. 23: "Les filets droits sont des nappes de coton ou de lin, teintées en bleu par du sulfate de cuivre (pour le sardine) et mesurant de 30 a 40 mètres sur une hauteur de 10 mètres; la ralingue supérieure est liégée, et la ralingue inférieure lestée de quelques plombs pour maintenir le filet en position verticale."

[2] Published by M. P. de Cenival and Th. Monod, under the title 'Description de la Côte d'Afrique de Ceuta au Sénégal.' Paris, Larose, 1938.

[3] *J. Soc. des Afric.*, **7** (1937) 40.

[4] *Bull. Com. A.O.F.* **20** (1937) 179.

sun on straw screens, while the fillets are taken off the bone and also set to dry, without salt. A trade is carried on by caravan with the interior and the noble families of the protecting tribe came to the Imraguen settlement to take a cure consisting of a diet of fresh fish and fish oil, both rich in vitamins.



So keen has been the competition in the past between the Moorish and the Canary fishermen, so far removed are the two peoples in origin, in technique and in civilization, that it is not surprising that social contacts between them have been rare. But it would seem that a *modus vivendi* was tacitly established on either side of an ideal fishing line, corresponding approximately to a depth of about 1 metre

50 below the lowest tide mark. This separates the fishing grounds which can be exploited by the Imraguen technique from those exploited by the Canary Islanders. This "gentlemen's agreement" must quite often have been violated: so much so, that one of the manifestations of contact between Canary Islanders and Moors in the past was the exchange of gun shots—the Moor, weapon in hand, sullenly keeping the Canary fisherman at a distance from "his" fish.

Nevertheless, peaceful relations developed up to a point. The Canary sailors needed to make a landfall from time to time, if not for provisions and fresh water (of which the Saharan coast, apart from Île d'Arguin, is notoriously bare), then at least to dry and repair their nets, to scrub the ships' bottoms, and to net bait from the shore. Permission to disembark was given by certain of the Moorish tribes, against a payment of dues or *horma* payable in fish and in *ogifo*, as the Canary men call the maize semolina which is the basis of their diet, and for which the Moors have a fancy. Some of these dues for services rendered persist today and perpetuate links forged in the past between certain Moorish tribes, notably the Ahel Laghzel or the Barikallah, and certain fishing families from the Canaries.

In 1905 an event took place which had an immense effect on the region. As a result of the mission of Professor Gruvel (see above) the French administration decided to establish on the Baie du Cansado (an inlet of the Baie du Lévrier) a military post and a fishing station stocked with equipment for distilling sea-water. Thus originated, in 1906, by a simple governmental decree and on a desert coast totally without fresh water, the town of Port Étienne, a human creation out of the void. The establishment of Port Étienne had both political and economic results. Once Port Étienne had been established as a military post, the local inhabitants learnt that it was no longer a question of regulating one's own quarrels at pistol-point; and the pacification of the region, virtually undisturbed except by the *rezzous* of 1924 and 1927, went a long way towards establishing an atmosphere favourable to more sustained and profitable contacts between the Moors and the Canary Islanders.

The establishment of the post of Port Étienne also resulted in important developments in the form of local industries which, since they concern the salting and drying of fish for export, have created an important market and a profitable outlet for the activity of both local and foreign fishermen. These industries, however, because of the interruption of the First World War, did not really begin to be important until 1921, the date which saw the inauguration at Port Étienne of the "Société Industrielle de la Grande Pêche" (S.I.G.P.).

In order to man its installations, this powerful firm found it necessary to recruit its own crews. It commanded a fleet which it manned and officered (except for certain French metropolitan officials) with Masters and crews from the Canary Islands, with whom it was thought wise to mix some natives to be trained. The firm soon had two small units under the command of "beydane" captains; they did not belong to the clans of the tributary Imraguen, but to the warrior caste itself. They were Nagi ould Mouknas, of the Ahel Laghzel tribe, and Cheikh Ould Ayé of the Oulad Delim.

Shortly before the Second World War the S.I.G.P. was nevertheless constrained, under pressure of outside circumstances, to give up running its own ships. It confined its activities from then on to buying from independent ship-owners and fishermen the fish needed to keep its plant in operation. The contacts between Moors and Canary Islanders were kept up, but under modified conditions. The end of the war provoked a renewal of activity at Port Étienne, marked by the establishment of

new industries and of an important plan of public investment for the equipment of a fishing station. Today, 3000 or more Canary sailors man the modern fleet, largely motorized, which pays its seasonal visits to the Baie du Lévrier and the Banc d'Arguin. A small fleet based on Port Étienne has also been built up by Canary immigrants. In this way, a race of hardy fishermen has at last achieved, by peaceful means, a foothold on that Saharan coast where for so long the natives have been hostile. Scores of little units—*balandros* and *lanchas*—are now based on these shores and play an appreciable part in the economy of Port Étienne.

The "beydanes" have not been slow to take advantage of this new situation. Quite early on, the Imraguen adopted the more efficient cotton thread to replace *titarek* (*Leptadenia spartum*) in making their nets. Apart from this improvement, their fishing technique has remained the same down to the present time. But they have learnt how to salt fish, with the result that in addition to their traditional markets for dried but unsalted fish, they have acquired the new market of the Port Étienne industries, giving preference to one or the other, according to the price rates obtaining.

The noble nomads who were allied to the fishing families of the Canaries, through the small services rendered by them against dues paid, saw their customary resources growing modestly. They hit on the idea of making a profit in the off season by watching over the small boats usually left behind by the Canary fleet at the end of the season at a tariff of 25 pesetas a month. For a similar consideration they would look after the sheds of gear, drying screens and other equipment which might otherwise have been abandoned when fishing was over for the year. The chiefs and notables made a more paying thing out of their traditional rights over jetsam. But these are only the crumbs of the cake: the Moors suffer from the drawback (if they wish to extract the maximum profit from these new circumstances) of not being themselves a sea-faring people. To benefit fully, they must have the means to buy boats, and this lack was remedied by administrative action as recently as 1951. At this date, the Société Indigène de Prévoyance de la Baie du Lévrier was founded—an organization for mutual aid to which all the native inhabitants of the region may subscribe and which plays the rôle of a maritime bank. Each member wishing to acquire from a Canary Islander a small ship (*lancha* or *balandro*) for his own use, receives from the Society the necessary money advance and agrees to repay it from the products of his fishing, plus a small interest, over two years. The member is trusted to have the good sense to have himself taught the double *métier* of sailor and fisherman, if he has not done so already. The Société de Prévoyance also undertakes, for a certain consideration, and with the help of a shipwright, the slipping and repair of the *lanchas* of its members.

The boats thus acquired are used in different ways, according to whether their proprietors belong to an Imraguen community or wish to adopt the technique and the *métier* of the fishermen from the Canary Isles; the latter is the case with individuals belonging to the warrior caste of "hassane" origin, whose gun has become, with the pacification, an honorary emblem or a hunting weapon, rather than a means of livelihood and a social necessity. The Imraguen who, as we have seen, stick to the traditional style of fishing, use their boats to fetch and carry between their encampments—Arguin, Îles Tidra and Serenni, Presqu'île de Thila, Cap Mirik, etc.—and their principal markets at Port Étienne. They come into the port with their fish, cut up and salted, and with the botargo which they offer for sale; and they return home with the goods, and sometimes with fresh water, which they buy for their own domestic use in the shops and depots of the town.

The aristocratic warriors, fallen from glory in a society where war is neither permissible nor of any practical use, still prefer in their hearts the life of the camel-owning nomads; they enjoy its liberty of movement and feel a legitimate pride in their traditional way of life. But one must live: what is more, one must survive droughts, epidemics, locusts and the train of famine which they bring. It is fully realized that those amongst them who become sailor-fishermen are laying up a valuable insurance against these risks: once a boat is purchased, it is only a matter of using it efficiently and of making it pay dividends in the form of fish—this is where the Canary Islander comes in useful. Generally, the first crews manning the *lanchas* bought through the Société de Prévoyance are mixed, the new Moorish shipowner taking on board at least one Canary sailor from whom he will learn the art of sailing and seamanship, the art of using lines and bait, and occasionally the *filet droit*, and how to look after his boat; he must be taught, too, the different operations of cleaning fish—gutting, filleting and salting. The profits are apportioned according to the type of contract usual in the region, depending on a system of shares, to be apportioned between the owner of the boat, the crew and, on occasion, the owner of the net. The share of the Canary Islander is augmented by a bonus, more or less generous according to the extent to which the Moorish master wishes to keep in with his often more highly skilled partner. As soon as he has become owner of his ship and has learnt the job, the native fisherman is generally anxious to acquire a *filet droit*. If he is more concerned with being an owner than a fisherman, he will usually follow the approved practice of signing on a mixed crew, whose Moorish element will be chiefly concerned with preventing the Canary partners from any unreasonable cheating of the owner!

Fifteen or so *lanchas* or *balandros* of small tonnage have been bought by the "beydanes" with the financial help of the Société de Prévoyance in the first two years since its foundation. One would often be in doubt at first sight about the racial affinities of the crews, if the Moors did not cling from habit to their long hair, of which they are very proud. Although they remain faithful to the flowing and shapeless Mohammedan robes for feast days and holidays, they wear on board the cotton shorts or trousers and jerseys which are the sailor's uniform all over the world.

It is certainly extraordinary to people who know the Sahara and the ways of its camel-owning folk, to see how many of these dyed-in-the-wool nomads are capable of adapting themselves to the seafaring economy of Port Étienne, so soon as they find it to their interest to do so. The surprise of the experts is still greater when they learn that those who take best to a life afloat are definitely not the subject people, despite their age-long connection with the sea, but their traditional warrior masters, known far and wide as the finest flower of Bedouin civilization. It is one of those unforeseeable phenomena which results from the evolution of an archaic society under the practical impact of colonization.

TABULAR ICEBERGS BETWEEN SPITSBERGEN AND FRANZ JOSEF LAND

K. S. SANDFORD

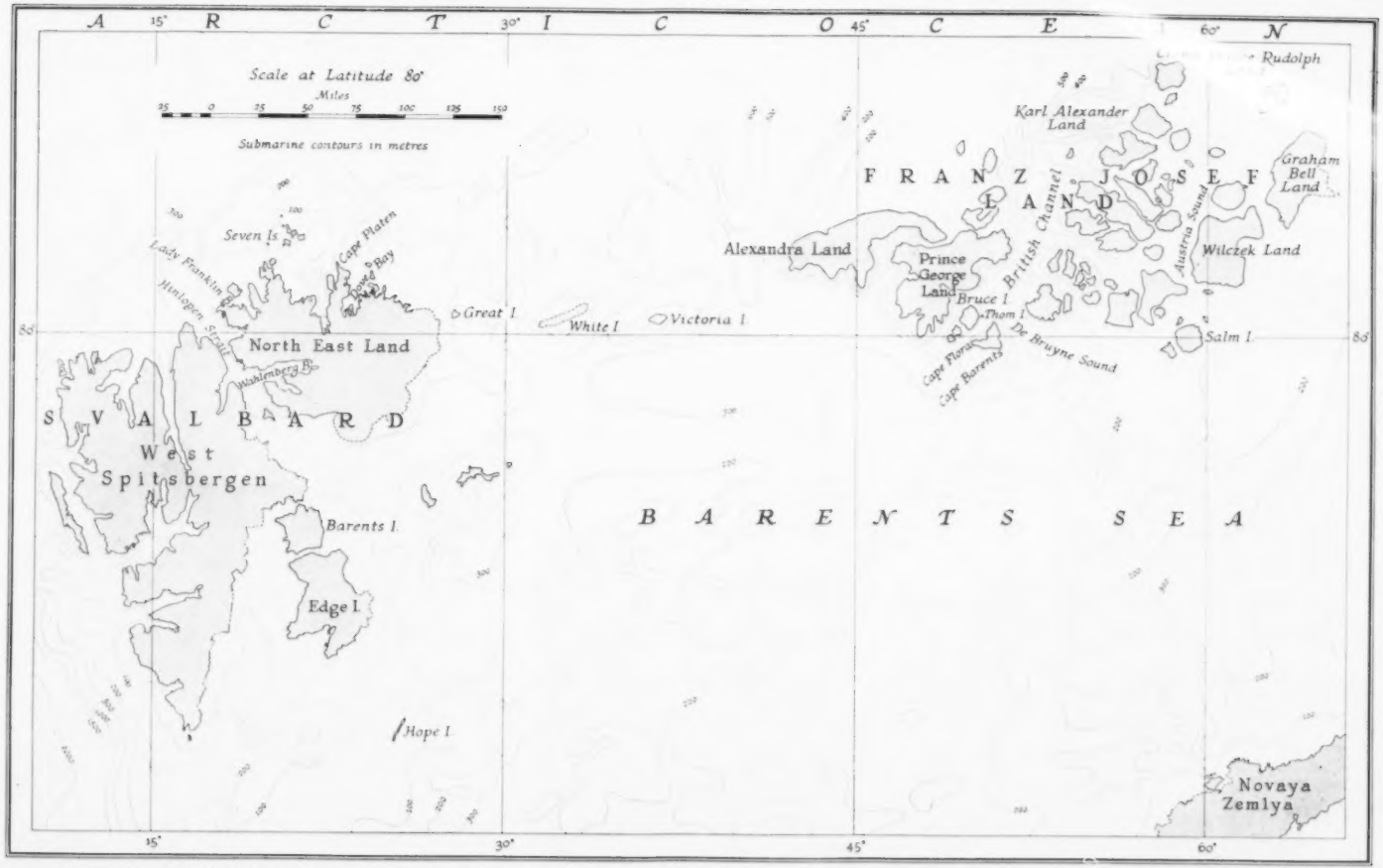
TABULAR ICEBERGS are generally regarded as typically Antarctic features, and their occurrence in the Arctic Basin and surrounding seas is less well known. The recent discovery and subsequent investigation of ice islands north of Arctic Canada and Greenland has revived, therefore, an interest which the writer has had for some thirty years in the occurrence of large tabular icebergs off the north and east coasts of North East Land (*see* map).

Of the photographs facing page 165, No. 1 is a large tabular iceberg, seen by the Merton College (Oxford) Expedition in open water north of Dove Bay in mid-August 1923. By reference to adjacent pack-ice and the wave-undercut at the lowest exposed part of the berg it is estimated that not less than 30 feet of ice were exposed above water level, and there may have been considerably more. This figure used to measure length, gives about 200 yards in one direction; the other face cannot be clearly seen. But, because of foreshortening and the possible underestimate of the wave-undercut, this figure may be a considerable understatement. The upper surface of the berg is seen in the photograph to be slightly convex. No. 2 is a photograph, taken on the same occasion, of a berg in a known position near a cliff at the north-west corner of Dove Bay (a few miles south of Cape Platen). Its cliffed margin shows clean bedding planes which also indicate breaks in accumulation. The height exposed above the surface of the sea is estimated to be rather more than 30 feet.

The Oxford University Expedition of 1924 saw a large tabular berg standing out at sea north of the Seven Isles, North East Land, on July 19. There was no opportunity to approach it, but its great size and clear-cut features were striking and it was described at the time in the writer's diary as looking like a long, lofty, flat-topped island. There is no reason to suppose that it was the berg seen further east in the previous year.

In addition to these large tabular icebergs the writer noted in 1924 a small drifting specimen near the northern end of Hinlopen Strait (between North East Land and western Spitsbergen) and others at the head of Wahlenberg Bay (central North East Land). Of these about 30 feet were exposed above the waterline and their length was trivial, about 20 yards; those in Wahlenberg Bay were congregated at the time near the east end, where a great glacier enters deep water and is afloat, but it is doubtful if they escape from the bay to enter Hinlopen Strait. An air photograph taken during the same expedition shows intensely crevassed small tabular bergs breaking away from the large glacier which enters Lady Franklin Bay, on the north-west coast. In 1924, therefore, small tabular bergs were coming from glaciers in the central and north-western parts of North East Land, calved into water deep enough to float them. But they were in no way comparable with the impressive examples of the northern coast, nor could the known currents have drifted them to such positions.

Commander F. A. Worsley, who was in these waters, and eastward to Franz Josef Land, in 1925 (Worsley, 1927) reports several tabular bergs and notes their similarity to those with which he was familiar in Antarctic waters. The following



From: 'Geologie der Erde: Geologie von Spitzbergen,' Hans Frebold

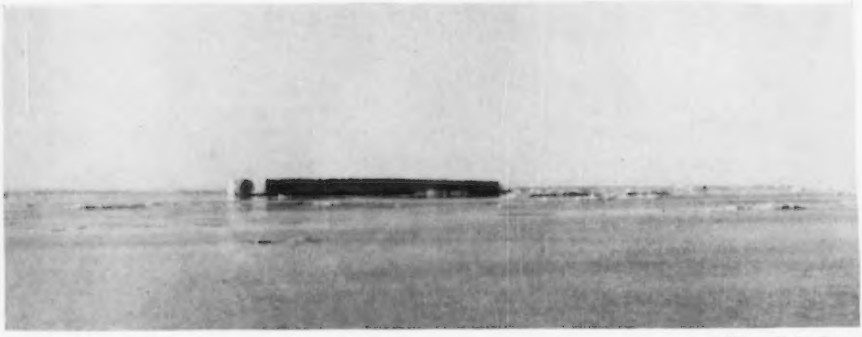


Photo: J. D. Brown

1. In open water north of Dove Bay, 1923

Photo: C. S. Elton

2. In north west corner of Dove Bay, 1923

Photo: W. Scott-Moncrieff

3. Between Cape Mohn and Isis Point, east coast of North East Land, 1949

TABULAR ICEBERGS

may be quoted from his book, and the general distribution of icebergs seen during his cruise is shown on his track-chart published therein.

Bergs were seen off the east and north-east of North East Land in late July and on his return in mid-September, one at least among the numerous large bergs seen north of White Island was tabular (text, and photograph opposite p. 76). Many were stranded around Victoria Island (p. 75). Among the islands of Franz Josef Land, in De Bruyne Sound and British Channel, large icebergs were common, "some being 200 feet or more in height," a few of them are table-topped (pp. 113, 118, 121). Worsley described (p. 123) his remarkable passage off Cape Barents between two tabular bergs 40–90 feet and 30–60 feet high respectively. Two are shown in a photograph opposite p. 124 of his book. On his return southward from British Channel, where several were seen, a stranded berg nearly half a mile long calved off Cape Barents (p. 142), and a few tabular bergs were seen at sea west-south-west of Cape Barents. On the return course he noted that they increased to the north of Gilles Island (or White Island) and he thought that they might have come from the north of Franz Josef Land, if not from the mythical Gillis Land (p. 163). In these waters a small tabular iceberg was measured; it had an 18-foot face and was aground in 16 fathoms (p. 168), or 29 metres. Further west a 40-foot blue berg (the others were white) was aground in 46 fathoms, or 84 metres. Inside De Bruyne Sound he records (p. 292) "we discovered Thom Island a small rocky islet probably uncovered by the breaking away of the Bruce Island ice-cap."

So far as the writer can discover there are no other published records of tabular bergs in the vicinity of North East Land or in the waters eastward to Franz Josef Land within the last thirty years. Thus Gunnar Horn, who sailed in the same waters in 1930, penetrating far along the south side of Franz Josef Land, reports no tabular icebergs, though he mentions others (Horn, 1931). Those who knew him, and his interests, will agree that he would probably have been explicit had he seen any of tabular form. Similarly the Norwegian–Swedish expedition of 1931 (Ahlmann and others, 1933) make no mention of them. Their ship, the *Quest*, repeated Worsley's and Horn's voyages to Franz Josef Land, succeeded in entering British Channel from the north and added to the general hydrographic work.

Members of the Oxford University expedition which wintered in North East Land in 1935–6 were constantly along the coasts and in the high interior for many months, yet there is no mention of large icebergs (Glen, 1937), and Glen states that none was seen, tabular or otherwise (verbal communication: see also Glen, 1938, 1939). The Norwegian air cover, made by B. Luncke in 1938, which the writer has studied in detail, reveals no large icebergs of any sort in the coastal waters of North East Land. Finally the Oxford expedition of 1949 photographed a tabular iceberg off the southern part of the east coast of North East Land. Information given by Hartog suggests that it was probably about 300 yards long (No. 3).

It is concluded, therefore, that large tabular icebergs were significant features in these waters, so far as the last few decades are concerned, between 1923 and 1925, and that subsequently they have at times certainly been absent and at others have escaped notice, if they were present.

An earlier group of records resulting from expeditions at the beginning of the century provides, first, Nansen's categoric statement (Nansen, 1897, p. 305) based on his journey across the Polar Basin in 1893–6. It reads as follows: "Icebergs of considerable size have been described as having been seen off Franz Josef Land, but I can only say with reference to this that during the whole of our voyage through

this archipelago we saw nothing of the kind. The one mentioned here was the biggest of all those we came across, and they were, compared with the Greenland icebergs, quite insignificant masses of glacier-ice." These remarks were added as a footnote to his description of a frozen-in iceberg encountered on 15 August 1896 in the vicinity of the north-east coast of Karl Alexander Land (north-east Franz Josef Land), which he describes as "the highest we saw in these parts—some 50 to 60 feet, I should say." It is illustrated in a photograph opposite p. 304 (*ibid.*); it is not tabular. There seems to be no mention of icebergs of any sort being seen from the *Fram* during the drift in the polar pack, nor during Nansen's sledge journey after leaving the ship, along a route which lay to the north and east of the regions in which tabular bergs are recorded in these notes.

Nansen's remarks are amply borne out by Jackson's experiences in Franz Josef Land in 1894–7, for icebergs are scarcely mentioned in the two volumes of his book (Jackson, 1899); there is a passing reference in Volume 2, p. 280 (with a photograph of a small, decayed, flat-topped berg); the British Channel is described as an open sea; text and illustrations show large glaciers and ice caps, but alternating seasons of pack-ice and open water around and among the islands.

The Duke of the Abruzzi's expedition of 1899–1900 (Duke of the Abruzzi, 1903) encountered much the same conditions; a stranded berg off Jackson's former base camp at Cape Flora, and another of moderate size near by; some icebergs in British Channel mainly on the west side, and others at the northern end, smaller than those first mentioned, "not more than ten to fifteen yards high" (*ibid.*, Vol. 1, p. 87). There is nothing to show that any of them were tabular. At the southern end of British Channel the ship encountered three large bergs on the return voyage, and moored to one of them. The part of it visible in a photograph (p. 333) seems to be about 20 feet high and flat topped. The expedition had acute difficulties with pack-ice at times, but there was also much open water. There seems to be no mention of icebergs in the account of Cagni's journey from the northern end of British Channel over the polar pack towards the Pole.

Nathorst visited White Island, between Franz Josef Land and North East Land, in 1898, and photographed a tabular berg south-south-west of it (Nathorst, 1900, p. 283). The writer is indebted to Mr. Charles Swithinbank for a translation of the Swedish text, from which it is clear that Nathorst first thought that icebergs were coming from the east coast of North East Land, but on arriving off White Island, which he described as a dazzling white ice cap in the form of a shield descending on all sides without a nunatak, he recognized the island as the source of the tabular berg. He adds, however, that he is aware of their possible origin in the east (*i.e.* Franz Josef Land).

Finally mention should be made of Sir Martin Conway (1897), who was off the north-west and south-west coasts of North East Land in 1896. He makes no mention of bergs to the north; his description of Hinlopen Strait and its southern approaches, with locally-derived small icebergs such as have been described above (p. 164), is certainly one of the best that has ever been published.

It is not intended to go into the available literature exhaustively in these notes, but the above selection will serve to show that at the beginning of the century icebergs were inconspicuous in the waters of Franz Josef Land, and that conditions in the waters surrounding North East Land were similar to those of the 1920's.

A generation earlier the Austrian expedition of 1872–4 (Payer, 1876) was contending with abundant large icebergs within the waters of Franz Josef Land. Thus

Payer describes (Vol. 1, p. 266) "a very large ice-berg . . . two moraines lay on its broad back" in 79° 24·5′ N., 61° 16·3′ E. (14 August 1873), which was their first concrete evidence of their proximity to the then unknown land to their north. The description suggests a berg of tabular form. They had previously encountered small examples off Novaya Zemlya, but Payer thought that the many large icebergs which they saw throughout the length of Austria Sound sailed away to the north (Volume 2, p. 77). He suggests indeed that the land might be the source of the icebergs in Barents Sea (Hope Island) and off the north coast of Siberia (Volume 2, p. 77). He records that they became detached from the glaciers in March and especially in May (Volume 2, p. 86). At the south end of Austria Sound "the south west corner of Salm Island was beset by a crowd of apparently stranded ice-bergs," and "one of these colossal masses" overturned. He describes vividly the bergs originating from the ice-covered Crown Prince Rudolf Land, in the north-east, where "we wandered among . . . pyramids, tables and cliffs" of the "innumerable ice-bergs from one hundred to two hundred feet high" in front of the Middendorf glacier (Volume 2, p. 143), and in Teplitz Bay ". . . into which a stream of glaciers, descending from high mountains of the interior, discharged itself. Ice-bergs lay along the terminal glacier wall which formed its shore. Ascending one of these masses, we found granite erratics on its surface" (Volume 2, p. 157). Granite does not occur in Franz Josef Land. Payer was familiar with the local basalt, and probably did not confuse Lower Cretaceous bedded sandstones with granite, so the remark, unknown to him, raises the possibility that some of the bergs had come from other lands. Payer adds (Volume 2, p. 158) "the ice-bergs of Crown-Prince Rudolf's Land, appearing enormously high, sailed through the still region." It is evident that conditions had changed drastically by Nansen's day.

Lamont (1876) remarks that Captain Nilsen met in 1872 a stream of icebergs between Edge Island and Spitsbergen and adds "we are here, probably, meeting the icebergs seen by Payer in the Straits about Franz Josef Land" (p. 216). They are not to be confused with the bergs of local origin that Lamont met in the same locality in 1871 (pp. 331–2). He describes in this book the south-westerly Polar drift from the region of Franz Josef Land.

A. E. Nordenskiöld (1879) makes no mention of icebergs off the north coast of North East Land in 1861 and 1872–3; he regards them (1881, Vol. 1, p. 182) as "boreal" rather than Polar, rare in the Polar Basin but common outside it.

Thus it seems that the occurrence and distribution of large icebergs within the water of Franz Josef Land and to the west and south in the early '70's was repeated in some measure in the 1920's, but was not of that order at the beginning of the century, or by the early 1930's and in subsequent years.

It is now well known that the Nansen or Polar Current sweeps westward along the north coast of Franz Josef Land, to divide off the east coast of North East Land; the southern branch continues south-westward over Barents Shelf, the northern along the north coast. Here it mingles with the last of the warm Atlantic water which flows northward off the coast of west Spitsbergen and turns clockwise along its northern shores. Worsley (1927, p. 294) describes the mingling of the cold and warm currents which takes place off the north coast of North East Land, and describes (p. 172) the rapid rise of sea temperature there at the time of his cruise (from 29° to 24° within a few miles) in mid-September. It is therefore unlikely that icebergs would be seen much to the west of this region, near the coast. They are

seen, however, as the writer observed in 1924, well out to sea west of the west coast of Spitsbergen.

Worsley has also pointed out (*ibid.*) that some Atlantic water drifts from the south-west along the southern front of currents which circulate round Franz Josef Land in an anticlockwise manner.

Large tabular bergs can be produced only by glacier- or firn-ice passing into, or standing in, water deep enough to float it. Those seen in 1923–5 would have grounded in less than 100 metres, or 50 fathoms, and some might have done so in appreciably deeper water. Currents and drifts of sea water must therefore be considered with relation to depth of water.

The deep Polar Basin lies close to the north of Franz Josef Land and North East Land, and an embayment extends southward from it between the former and Victoria Island (see map). Tabular bergs of great size can float here, and along the southern margin of the Polar Basin, but must ground elsewhere, and the geographical distribution by draught is controlled thereby. In effect, comparatively insignificant bergs may drift over Barents Shelf, and large specimens, which ground off Victoria Island, White Island and the coastal waters of North East Land, drift with the northern branch of the Polar Current, north of North East Land. So it follows that, owing to shallow water, considerable tabular bergs are unlikely to be calved from the east coast of North East Land, which is essentially an ice-cliff, and indeed the great surge of ice discharged in the Bråsvellbreen at the south-east corner in the late '30's (Glen, 1941) seems to have produced insignificant floating ice masses for that reason. In some degree the same strictures apply to Great Island and White Island: Victoria Island lies near the deep water; channels more than 100 fathoms, or 183 metres, deep penetrate the Franz Josef Land archipelago.

On account of the facts set out in these notes the arrival of large tabular icebergs off North East Land and the presence of abundant floating and grounded bergs between that island and Franz Josef Land is thought to have some significance, which may be summarized as follows:

1. The bergs came from both the north and south of Franz Josef Land, and from its deep channels; some may have been calved from Victoria Island and White Island.

2. There was great glacier activity, calving and production of icebergs in Franz Josef Land in the 1870's.

3. By the end of the century these activities had subsided and bergs were virtually absent from Franz Josef Land, and insignificant along the Polar Current to the west (Nathorst notes the exceptional tabular berg off White Island).

4. By the 1920's the inner waters of Franz Josef Land were liberally supplied with tabular bergs, so were the seas around, and they arrived off North East Land. There was no evidence of glacier activity at that time, and Worsley attributes his discovery of Thom Island to the breaking away of the Bruce Island ice cap.

5. The floating masses of land-ice having been cleared away, the coasts and channels of Franz Josef Land, and the seas westward to North East Land seem to have been remarkably clear of spectacular icebergs (1930's onwards).

It is concluded, therefore, that in Franz Josef Land both glacier activity, pushing large unbroken masses of ice into deep water (1870's), and relative glacier inactivity leaving such masses the victims of weather, tide and current (1920's), have produced streams of icebergs floating with the Polar drift.

It has been assumed that the bergs described in these notes consisted of ice from glaciers and ice caps, and indeed the evidence is fairly conclusive. But it is natural

to enquire whether the considerable dispersal of large tabular bergs at times in these waters is to be associated directly or indirectly with the course of ice islands originating on the Greenland–Canadian side of the Polar Basin (Koenig and others, 1952). It is evident that Canadian ice islands might escape from the Polar Basin into the north Atlantic by the Greenland Sea, and that a further deviation of drift would cause them to enter the Polar Current off Siberia, where indeed analogous ice-masses have been reported (*ibid.*, pp. 91–2). There is no evidence that a drift of that description has transported the icebergs mentioned in these notes, and on the whole their appearance does not suggest it. Nor is there concrete reason to suppose that a surviving mass of ice-shelf, such as is known on the north coast of Ellesmere Island (Hattersley-Smith, in Koenig and others, 1952, pp. 95–102), has broken up in the northern waters of Franz Josef Land since the 1870's.

To the writer it seemed difficult, however, to credit in 1924 that a few decayed icebergs at sea west of Spitsbergen had come either from east Greenland or west Spitsbergen; they seemed to him to belong essentially to the Polar Current, and so may be a chapter in the story discussed in these notes. If Payer was correct in identifying granite erratics on his iceberg at Crown Prince Rudolf Land, there would be strong reason to believe that far-travelled icebergs reached those shores, and enhanced interest would attach to the recent occurrence of a large flat-topped berg at the islands (Severnaya Zemlya) immediately east of Franz Josef Land, and of icebergs at Wrangel Island, off the Siberian coast (Zubov, 1948). It might in fact be demonstrable that no source in the European or Siberian Arctic could be attributed to the granite.

The nearest regions in which granite occurs are in eastern Spitsbergen waters and Novaya Zemlya. From the former an iceberg would need to drift against the Polar Current to reach Crown Prince Rudolf Land, which is most improbable, and in the latter granite occurs south of the glacier-covered country (*cf.* map in Frebold, 1950) It is also improbable that icebergs of the type calved from the northern glaciers of Novaya Zemlya would drift to Crown Prince Rudolf Land.

The arctic coasts and islands of Siberia are generally without glaciers; the Russian observers therefore assumed that icebergs seen off Wrangel Island in 1946–7 had come from north-western Greenland. The large flat-topped berg off Severnaya Zemlya was seen in 1943. The drift on the Polar Current of pack-ice with mud and shells (Fuchs and Whittard, 1930) and logs of coniferous wood, from the Siberian coasts to Franz Josef Land, Spitsbergen, and east Greenland is well known.

Summary

The occurrence of tabular icebergs is generally regarded as unusual in the Arctic Basin and surrounding waters. They were seen between Spitsbergen and Franz Josef Land during the years from 1923 to 1925, and there is no record of their subsequent appearance off North East Land until 1949. They seem also to have been scarce in the earlier part of the present century and in the immediately preceding years, but were probably present at least within the Franz Josef Land archipelago in the 1870's.

Those seen between 1923 and 1925 had evidently drifted in a general westerly direction towards North East Land and along its north coast, carried by the Nansen current, and are thought to represent some unusual event. It is probable that they came from lands lying to the east of North East Land, but their arrival from remoter parts of the Arctic Basin cannot be entirely discounted.

Addendum

After the proofs of these notes had been passed for publication, Mr. Geoffrey Hattersley-Smith, returning from Canada, has put at my disposal literature which has appeared in recent months, including translations of recent Russian publications. It is shown, first, that a considerable glacier entering a fjord in Severnaya Zemlya gives rise to flat-topped icebergs (one of great size, observed by Russian airmen, see above), which might drift westward by way of the northern waters of Franz Josef Land and Spitsbergen, and might bear granite-like erratics (*e.g.* metamorphic rocks). Secondly, it is probable that one of the ice-islands from the Canadian–Greenland sector, T2, has already entered the Greenland Sea, *i.e.* it has passed between Greenland and Spitsbergen probably close inshore to the former.

A rapid scrutiny of the literature so opportunely made available suggests that no essential modification of my notes is necessary, and that on the whole they provide some links from the northern margins of the European (Barents) shelf between observations, of which I was unaware, in Canadian–Greenland and Siberian waters.

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WATER FROM THE DESERT: SOME ANCIENT EGYPTIAN ACHIEVEMENTS

G. W. MURRAY

IN EGYPT, 6000 years ago, when the latest "rainy interlude" began to wane, neolithic tribesmen from both sides flocked into the Nile Valley and there perforce exchanged a pastoral existence for an agricultural one. The nomads who remained in the eastern desert could do little more than follow the scanty rains; west of the Nile, where there is no wadi network to concentrate the fall, the rain evaporated as it fell, the water table sank out of reach and the victory of nature over nomadic man was complete. Within a few generations the peasant Egyptian had become, in Winkler's phrase, "a stranger to the desert, the land of his forefathers."

Some centuries later, when the kingdoms of Upper and Lower Egypt had united, the coordination of labour into vast gangs had strengthened man's hand, and now and again he began to fight back. To the deserts the new "strangers" returned to seek gold and copper, turquoise and ornamental stone; and, to sustain their assaults, water was necessary. The Bedouin cousins of the Egyptians had done no more than scoop out a few shallow holes. Now, some unknown Pharaoh, with an architect far ahead of his time, attacked the problem in the grand style of the Pyramid Age.

The oldest dam in the world.—Seven miles south-east of Helwan, in the Wadi el-Garawi, one may still see the abutments of the Sadd el-Kafara, the "Dam of the Pagans," the first of its kind in history and one whose failure was so catastrophic that nothing of the sort was attempted again till over 3000 years had passed.[1]

Its age is not in dispute. From the style of its masonry and the nature of the potsherds lying in the workmen's huts about 200 yards from the site, Professor Schweinfurth who discovered the dam in 1885,[2] Mr. Ernest Mackay who visited it in 1915 [3] and Mr. Guy Brunton who accompanied me to the site in 1935,[4] all agreed in ascribing its erection to the period of the IIIrd or IVth Dynasties, from 2950 to 2750 B.C.

For an initial experiment in dam construction, the size of the structure is surprising: I took the measurements quoted myself in June 1945. It is 348 feet long at the top and about 265 feet at the base; the lintel stood 37 feet above the lowest point in the wadi floor; and, passing through the great breach, one sees that the dam was composite. That is, it was made up of two separate rubble masonry dams, each 78 feet thick at the base, with a space of 120 feet at ground level between them, which was later filled in with over 60,000 tons of shingle from the wadi bed and rubble from the hillsides. Beyond that, some 30,000 cubic yards of rubble masonry, say 40,000 tons, were employed in the construction of the upstream and downstream dams—a task that must have occupied the energies of many hundreds of men and animals for a whole season in this desert place, 9 miles from the Nile cultivation.

[1] The dam at Marib may be the second. In the Egyptian deserts, no other dam was built till, in 1947, one was thrown across the Wadi el-'Arish at El-Ruafa. By 1951, this was so silted up as to be useless for irrigation.

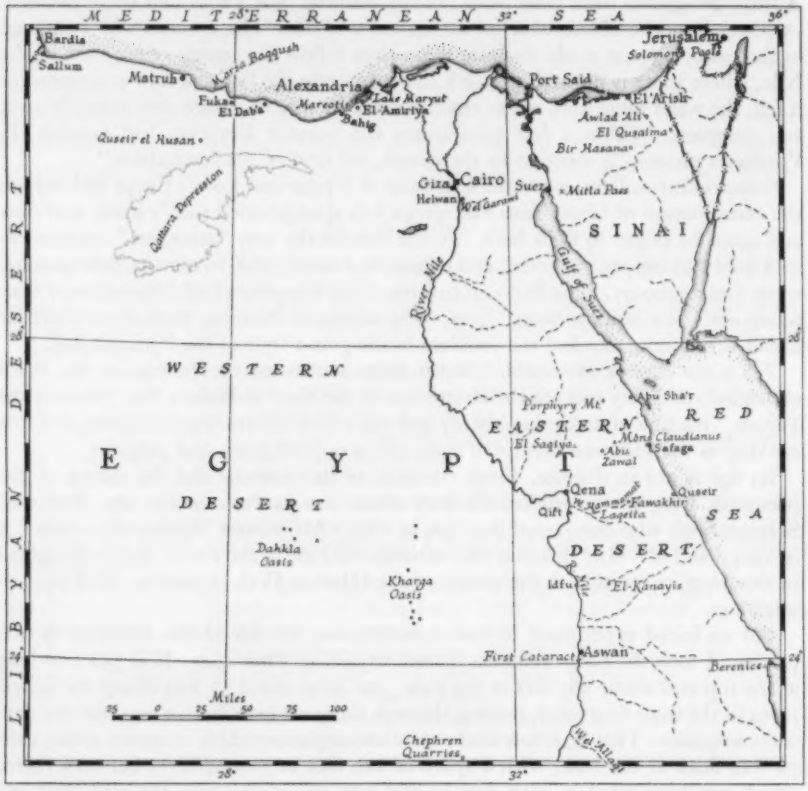
[2] Schweinfurth, G. 'Auf unbetretenen Wegen in Aegypten.' Hamburg, 1922, 213–31.

[3] Petrie, W. F., and E. Mackay. 'Heliopolis.' British School of Archaeology in Egypt, 1915, p. 38.

[4] Personal communication.

Quite possibly, to avoid interruption by floods, the construction took place in summer.

The dam was faced on the upstream side with a carefully laid covering of roughly dressed limestone blocks of about 50 lb. weight, set in stepped courses, 11 inches high. Sighting along the length of the dam from one abutment to the other, there appears a definite sag in the top course, which can hardly have been intentional. The maximum amount of this can no longer be determined, owing to the great breach, 44 yards wide, in the centre; but, of course, whatever it was, it directly

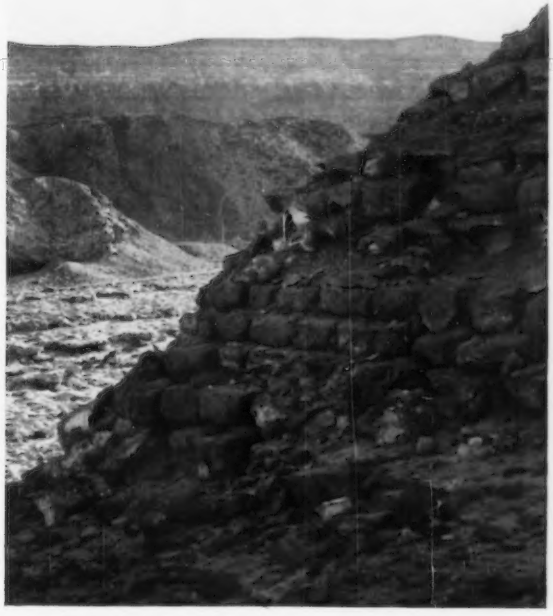


diminished the effective height of the dam. This sag does not seem to have taken place after the breach, for there is no sign of slip in the abutments, so it may possibly have resulted from a general settlement in the loosely compacted structure after erection. I say "loosely compacted" because no mortar was employed in the dam. This may seem incredible; but the ancient Egyptians did not look upon mortar as a cementing material, but merely used it as a lubricant in moving heavy blocks and as a means of levelling the top of a course before the next was set upon it.[1]

Except for the carefully laid upstream face, the dam has the appearance of having

[1] Clarke, Somers, and R. Engelbach. 'Ancient Egyptian Masonry.' Oxford, 1930.

Wadi el Garawi dam, looking downstream



Fourth Dynasty (c. 2800 B.C.) facing of the dam

Mouth of a cistern in the Western Desert (*See p. 178*)

The great excavation at El Saqiya

been built in haste, particularly the downstream portion or, rather, what remains of it. One obtains the impression that the architect was pressed for time and, moreover, that he never invisaged the possibility that the impounded water might one day overflow the dam and ruin the structure.

One observes, too, that no spillways were provided to carry off surplus water and the conclusion follows that the water which was to be stored in the reservoir was not intended to be used for irrigation. Indeed, there is no land capable of cultivation in the Wadi el-Garawi. Again, from this absence of spillways, we may deduce it was never intended to fill the reservoir completely. By the Pyramid Age basin irrigation in the Nile Valley had passed its infancy and the designer of the Wadi el-Garawi dam must have been well aware that whenever an earth dam came to be overflowed, a breach took place. The great height of his structure is thus accounted for; the problem before the ancient engineer having been that of building a dam large enough to withstand and contain any flood that might come from the Wadi el-Garawi.

Upstream of the dam the bed of the wadi rises at the rate of 1 foot in 100, which means, of course, that the dam height of 37 feet ceased to be effective in holding up water at a distance of 3700 feet upstream. For that distance the cross section of the wadi remains remarkably uniform—so much so that Schweinfurth likened its channel to that of a "ship canal"—and the volume of the water once held up in the full reservoir may be approximated to the quarter of an ellipsoid with its major radius 174 feet, the half-length of the dam; its minor radius, 37 feet, the height of the dam; and a length of 3700 feet, that of the reservoir. From these assumptions, the capacity works out at 573,000 tons of water. The ancient Egyptians had an empirical formula for computing the volume of a cylinder and may, possibly, have had some rough idea of how much water their reservoir would hold, if filled. Not that I believe they ever intended to fill it. It was merely designed to contain the largest flood that was likely to come down the Wadi el-Garawi.

Schweinfurth formed the opinion that the dam had been erected to provide drinking water for the workers and beasts at some alabaster quarries about two miles to the east of the dam. No other local industry has left any trace and, in the absence of any alternative theory, his falls to be accepted. But, if we accept it, there must have been an intention to develop these quarries, which have never been worked on a large scale, to an almost modern pitch of mass production. In the Pyramid Age that may very well have been the case. The Pharaohs of the IIIrd and IVth Dynasties loved rare stone and the exploitation of rare stone. King Zoser had 90 tons of stone vases, most of them of alabaster, buried with him under the Step Pyramid of Saqqara; Chephren had six colossal statues of himself cut from an intractable rock, only to be found in the Nubian desert, 40 miles from the Nile and 150 above the First Cataract. Mycerinus cased the lower half of his Pyramid with 6-ton granite blocks from Aswan, 480 miles from Giza. Towards the close of that age, what more tempting suggestion could have been put forward to a Pharaoh, perhaps elderly at his accession and certainly dismayed at the prospect of having to erect a Pyramid larger than that of Cheops and higher than that of Chephren, than that his should outshine theirs in beauty, not size, and be cased in alabaster? Such an enterprise once decided upon, all the puzzling circumstances in the Wadi el-Garawi dam stand explained; the need for the vast reservoir of water; the construction of the dam in haste; the carelessness as to what might befall it after the alabaster had been extracted. So it came about that the dam was built in a hurry and the rain, that was to make the extraction of the alabaster feasible, was eagerly awaited.

Let us give a little consideration as to how much rain it was reasonable to expect. We moderns have an advantage over the designer of the Wadi el-Garawi dam of knowledge of the area of the catchment upstream of the dam—72 square miles—and in access to the rainfall records kept at Helwan Observatory for over forty years. Any estimate of the proportion of run-off to rainfall is always a matter of difficulty since it depends on the intensity as well as the actual amount of the fall. The slope of the catchment is very important, while, on a parched desert surface, the absorption of the rain by the ground is a most potent diminishing factor. Yet we shall not err greatly in assuming empirically, first, that daily falls of less than 8 millimetres (one-third of an inch) will cause no sensible run-off and, secondly, that the amount of run-off in the case of greater rainfalls may be found by deducting 8 millimetres from the daily total and then taking one quarter of the remainder as the run-off. A rainfall of 10 millimetres or over in a single day occurs on the average in three years out of four in the vicinity of Helwan; during the years 1904–44 there were 29 of such falls, 10 of which exceeded 20 millimetres. It is probable, therefore, that the ancients hoped that some water might be collected almost annually in their reservoir and that, with good fortune, sufficient might be obtained to last throughout the summer until another winter's rains and so permit of continuous work on the enlarged scale at the alabaster quarries. They were obviously ignorant of the fact that a single millimetre of run-off from the catchment area of the Wadi el-Garawi is represented by a volume of water of 185,000 tons.

And so we come to the catastrophe. Not long after the dam was finished, perhaps with the very first flood thereafter to come down the wadi—there is not the least trace of any silting upstream of the dam—a breach took place. No great fall such as that of May 1945 when some millions of tons of water went careering down the wadi need be invoked to cause it. A fall of 20 millimetres, of which there have been ten in forty years at Helwan, would be quite sufficient. Of that 20 millimetres, 8 would be immediately absorbed and a quarter of the remainder, between 500,000 and 600,000 tons, would go rushing down the wadi, fill the reservoir, overflow the dam and begin to tumble in a thundering cataract, 37 feet high, over the shoddily built downstream face. Such a waterfall would not take long to eat its way back through the rubble filling and breach the upstream face of the dam. The contents of the reservoir would then be let loose to rush down the wadi to the cultivated lands and the Nile. So, in a few hours and, probably, at night,[1] were destroyed all the results of the labour of many hundreds of men and animals, the reputation of the engineer and all possibility of mass production of alabaster in the Wadi el-Garawi.

For us, situated at the dispassionate distance of 5000 years, it is hard not to feel sympathy with the unknown engineer who so boldly attempted the impossible—for that age. His was as notable a failure as that of Brunel with his *Great Eastern* or that of Winstanley with the first Eddystone Lighthouse; but with a difference. The modern attempts were not absolute failures. They pointed the way for the successful designers of the next generation. But the Sadd el-Kafara is no landmark in the history of engineering. It was an outstanding solitary adventure which merely taught the ancient Egyptians never to attempt anything of the sort again. Its designer thought far ahead of his time. Had he made use of mortar, had he provided a spillway, had he chosen a wadi with a gentler slope, how different might have been the history of Egyptian irrigation! But the Sadd el-Kafara was a real failure and these are vain regrets.

[1] Of seven great floods in Egyptian wadis of which I have had personal experience, all came down at night.

Deep wells.—By the time of the IVth Dynasty, the Egyptians had become expert at sinking shafts through soft rocks like limestone or sandstone—their 120-foot shaft to the tomb of Hetep-heres, Cheops' mother, beside the Great Pyramid proves that. From granite, they could split off great blocks but well-sinking through great thicknesses of hard rock was probably beyond them. Two wells were sunk in sandstone on the road out to the Chephren quarries in the Nubian desert, 37 and 45 miles from the Nile at a point where one would not now expect to meet with water much under 200 feet down. But we do not know that either of these bores was successful and until their shafts are cleared, the depths must remain a matter for conjecture. Certainly, 6000 years ago, the water table under the Libyan Desert must have been much higher.

During the Eleventh Dynasty (2160–2000 B.C.) there was well-sinking on the road to the Wadi Hammamat from Coptos (Qift) to supply water to the multitudes who were sent out to cut and drag in monuments of *bekhen* [1] stone. Their numbers are recorded on the rocks of the wadi—an expedition of 3000 men under Henu during the reign of Mentuhotep III, of 10,000 under Amenemhat for Mentuhotep IV; and, much later, of 8363 men plus "900 who died" in the reign of Rameses IV (1167–1161 B.C.). Henu thus describes his mission [2] "My Lord sent me to despatch a ship to Punt to bring for him fresh myrrh from the sheikhs of the Red Land by reason of the fear of him in the highlands. So I went forth from Coptos upon the road which His Majesty had commanded. . . . I went forth with an army of 3000 men. I made the road a river and the Red Land a stretch of field. I gave a leather bottle, a carrying pole, two jars of water and 20 loaves of bread to each one among them every day. The asses were laden with sandals. Now I made 12 wells in the bush and two wells in Idehet, 20 (square?) cubits in one and 30 (square?) cubits in the other. I made another in Iheteb, 10 cubits by 10 cubits on each side."

Idehet and Iheteb cannot now be identified, but the wells "in the bush" must have been sunk at Laqeita, the Roman *Phoenicon*, 20 miles out from Coptos where the water table is near the surface and the digging of twelve wells would have been possible. There is scrub in the wadi beside Laqeita and a palm grove at the modern wells and hamlet.

In the Wadi Hammamat itself the present well is 100 feet deep and, no doubt, of great antiquity. But its water is brackish and there is a better well 5 miles further on at Fawakhir. This, however, gets periodically buried by downwash and has to be dug out. This, Amenemhat's expedition had to do. After heavy rain, "the highland was made a lake, the water extending to the margin of the rocks." After the lake subsided, the mouth of an old well was revealed, "ten cubits on every side. Soldiers of old and kings who had lived aforetime went out and returned by its side yet no eye had seen it." [3] This is the well shown, with a stela of Seti I and a garden beside it, on the oldest map in the world, a Ramessid [4] papyrus preserved in Turin. Seti's stela has long vanished and the well itself got buried again, for travellers of the eighteenth and nineteenth centuries make no mention of it. About 1905 it was cleared out by a company seeking to revive the neighbouring gold mine and in

[1] *Bekhen*, which has been mistranslated "tuff" and "schist," is really a "greywacke," Andrew, G. "The Greywackes of the Eastern Desert," *Bull. Inst. Egypt*, **21** (1939) 153–90.

[2] Breasted, J. H. 'Ancient Records of Egypt: Historical Documents,' Vol. I, Chicago, 1906, 429–31.

[3] BAR, I, 451.

[4] Sir Alan Gardiner pointed out long ago that the name of Ramesses VI (*c.* 1150 B.C.) occurs on the *verso*. *Cairo Sci.* **8** (1914) 42–46. A section of the Turin Papyrus map was reproduced in *Geogr. J.* **121** (1955), plate facing p. 5.

1911 I saw it with a small illegal garden of tobacco, just where a garden is shown on the papyrus. In 1951, it was supplying abundant fresh water to a new mine at El-Sidd.

Seti I (*c.* 1313–1292 B.C.), himself chose the site for a deep well at El-Kanayis, 26 miles out from Idfu on the road to the central group of gold mines. When it was reopened in 1905, the well had to be cleared to 180 feet down before water was reached. It then rose 42 feet in the hole. The same Seti I failed to reach water in a shaft of 120 cubits (206 feet) in the Wadi el-'Allaqi on the road to the southern mines which produced "the gold of Kush." So says a stela found in the fortress of Kubban at the mouth of that wadi, which adds: "His well is forsaken by the road for no water came out of it." At the foot of a much inscribed rock called Huqab el-Askar, which marks the end of the second stage out from Kubban, is the trace of an immense excavation which may well have been that of Seti I. His son and successor, Rameses II (1292–1225 B.C.), boasts of finding water in the same wadi at 12 cubits.[1]

Artesian Wells.—In the western oases of Kharga and Dakhla the artesian water lies concealed beneath a succession of thick clays and it is not known when the inhabitants first learnt of its existence. The earliest local inscription dates from the nineteenth year of Sheshonk, about 905 B.C., and recounts the success of a priest Nesubast in a law suit of fourteen years' standing by which he established his right to a well in Dakhla.[2] Though in Dakhla the clay varies from 100 to 300 feet in thickness, it seems likely that the knowledge that there was water below it was first obtained in that oasis. For, in Kharga, the clay is thicker and there are no traces of a civilized occupation before the Persian invasion in 525 B.C.

In Kharga there are two successions of water-bearing strata with 250 feet of clay between them and, naturally, the superficial layers were exploited first. But the yield from this "surface-water sandstone" began to fall some 2000 years ago and, at Umm el-Dabadib, four great collecting galleries (of which an account is given in the next section) were then driven into them by people with a knowledge of Central Asian practice. Later, in the light of the knowledge acquired in Dakhla and, perhaps, with iron tools instead of copper ones, an attempt was made to pierce the clay and tap the immense thickness of saturated strata underneath. Success followed success and, even at the present day, there are numerous ancient bore-holes producing hundreds of gallons a minute.

Up to the beginning of the present century any new shaft sunk was usually rectangular and about 6 feet square. The adze-like implement called a *fas* [3] was almost the only tool employed. As the shaft went down, it was lined with casing made from wood of the palm or the acacia, to prevent the sides from caving in. After the clay was passed, the excavation went on through the frequent intercalations of waterlogged strata till the water began to rise in the hole. Some of the Kharga wells are 400 feet deep and, in such cases, preparations must have been made for a speedy withdrawal on reaching the saturated strata; for the lower waters are under strong pressure and, when tapped nowadays, rise very rapidly in the bore.

Cleaning has usually to be carried out under water. For, though the well may have ceased to flow, the shaft is seldom so completely blocked as to prevent the water rising to within a few feet of the surface. At Hindaw in Dakhla, the late Dr. Beadnell saw divers working at a depth of 94 feet. Each diver made six or seven

[1] BAR, III, 289.
[2] BAR, IV, 726.
[3] The iron *fas* dates back only to Roman times. Clarke and Engelbach, *op. cit.*, 224.

descents a day, remaining on each occasion from two to two and a half minutes under water. Work had been in progress there for four years and there was still some 50 odd feet to be excavated before reaching the bottom of the well.[1]

Collecting galleries.—Where the yield from a saturated stratum is slight or failing there is a method, first perhaps developed in Central Asia, of driving a tunnel into the outcrop to act as a collecting gallery where the drip from the wet walls may be less exposed to evaporation, the bugbear of the desert farmer. At the outlet, the flow is taken off by a canal. Such galleries are called *khariz* by the Persians and *fuqara* in Palestine. At Umm el-Dabadib in Kharga Oasis, there are four of these runnels, driven into the "surface-water sandstones," perhaps during the Persian occupation (525–332 B.C.). Allowing for numerous windings and side galleries, they total about 10 miles in length and almost as much excavation again was necessitated by the sinking of numerous shafts or "manholes" along the lines of the tunnels up which the spoil from the excavation was hoisted to the surface. Beadnell found 150 shafts along the line of one of them, only 3200 yards long, and calculated that 4875 cubic metres (about 11,000 tons) of rock had been removed from that tunnel and its shafts alone. The tunnel had been choked by debris till about 1900 when the local people cleared it with the result that "after a lapse of perhaps 1000 years water again flowed from the mouth of the aqueduct and enabled a small agricultural colony to establish itself on the ruined site of the original founders." [2]

Other collecting galleries are to be found just west of Marsa Matruh where the coast is fringed by a chain of consolidated dunes. Rain on these dunes combines with run-off from the hills inland to form a tenuous film of fresh water floating on a salt infiltration from the sea. This the ancients reached, not by driving a tunnel from an outcrop, but by sinking shafts and connecting them by tunnels at water-level. The section of the gallery thus made is shaped somewhat like the spade on a playing card with about a foot or 18 inches of fresh water standing in the bottom channel.[3] From this in ancient times it must have been lifted by a water-wheel.

The first of these galleries was discovered and cleared in 1931 and an average of 75 tons of fresh water used to be pumped from it daily. If that amount were exceeded, the salt water rose in the gallery and the salinity of the product was greatly increased. When cleared out, the length of the gallery was almost exactly one mile. Later, a second collecting gallery was discovered near by with a daily yield of 56 tons; while the Egyptian Army dug in sand a third, 2500 yards long, with a yield of 63 tons.

During the late war, the British Army recognized the value of these collecting galleries by digging several short galleries, some of them mere covered trenches with high yields at Burbeita (213 tons a day) and Marsa Baqqush (131 tons a day), while the Italians did the same thing at Bardia and Tobruk.[4]

Nearer Alexandria, the ancient monastic settlement of Abu Mina (St. Menas) which was abandoned about A.D. 1000, was supplied by twelve wells, all about 88 feet deep. Some of them, if not all, were connected underground by tunnels, which may have served as collecting galleries when the water table was higher. It has now sunk below the bottom of the old wells, owing to the drying up of Lake Maryut, which is now about 12 feet below sea level.

[1] Beadnell, H. J. Ll. 'An Egyptian oasis,' 1909, London.

[2] Beadnell, H. J. Ll. *op. cit.*, 171.

[3] Walpole, G. F. "An Ancient Subterranean Aqueduct west of Matruh," Survey of Egypt Paper 42, Cairo, 1932.

[4] Addison, H., and F. W. Shotton. "Water Supply in the Middle East Campaign, in August 1946." *Wat. and Wat. Engng.*, 49 (1946) 427–36.

Cisterns.—Artificial underground cisterns are common in Palestine but very rare in Northern Sinai and unknown east of the Nile in Egypt. I only know of two; one on the Darb el-Hagg not far east of the Mitla Pass and the other in the angle formed by the two roads leading to El-'Arish from Hasana and Qusaima. The inhabitants of the Mediterranean littoral between Alexandria and Sallum, however, possess some 3000 of them, excavated in ancient times wherever the farmers could find a soft stratum of marl sandwiched between two hard ones of limestone. A very few of these are adaptations of natural caverns and these are, of course, irregular in shape. Otherwise, they are almost invariably rectangular. Out of the hundreds of cisterns measured by the Survey of Egypt before the late war the only circular one was at Quseir el-Husan south of Fuka. They are fed by short vertical shafts in whose sides footholds have been cut to provide access to the interior for cleaning purposes. Most of them were plastered in Roman times; some do not seem ever to have been coated with anything but the silt left by the muddy rainwater and the Arabs say that a very few drenchings with this suffices to make them watertight.[1] Their capacity, from 20 to 2000 tons, naturally bears some relation to the catchment area available. There is a tendency for them to increase in size as one travels westwards. Every generation or two they become filled with silt and, since their ownership is often in dispute, clearance only takes place under a settled government. For it is a laborious business and nobody is going to hoist up some hundreds of tons of mud merely to benefit a rival. Consequently, during the Middle Ages, most of the cisterns got filled in and are only now being brought gradually into use again. Their sites are seldom lost. For the spoil heap which resulted from the original excavation usually remains as a little white mound beside the opening of the shaft—a very conspicuous mark in that flat countryside.

One Isalas plastered a cistern near Matruh in the 22nd year of Augustus (A.D. 6) and signed his work with a handprint. They are, perhaps, older. Herodotus (iv, 173) speaks of the Psylli of Cyrenaica becoming extinct on account of the drying up of their ἕλυτρα by the south wind. But a south wind could have little or no effect on water in a subterranean cistern, so the ἕλυτρα may have been open tanks like those at Solomon's Pools near Jerusalem.

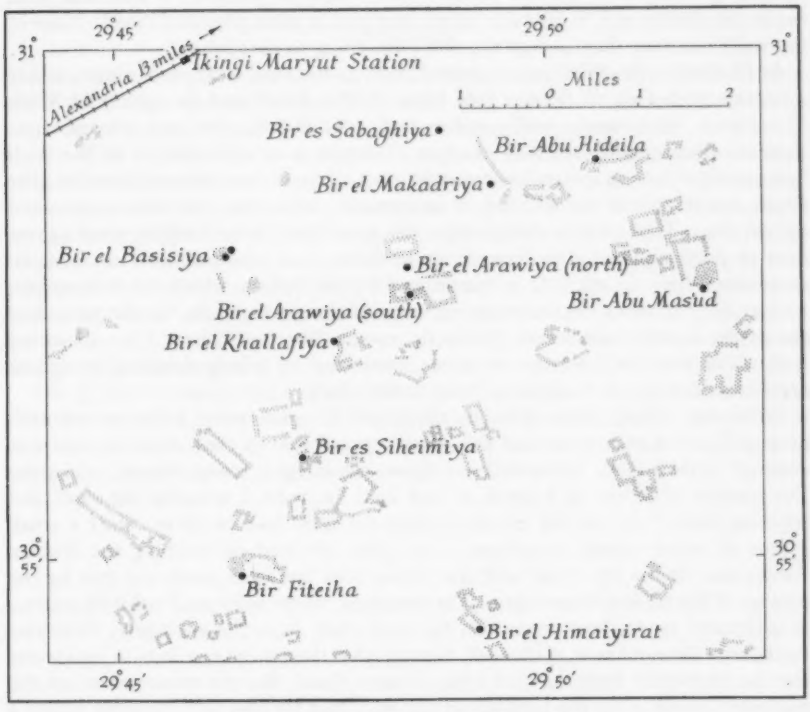
Embanked fields.—On Maryut, the region south and west of Alexandria, the fall of rain is very capricious. At El-'Amiriya, precipitation averages only 138 millimetres a year and, though there are occasional falls of 50 millimetres (2 inches), yet three years' droughts are not quite unknown. These conditions are of long standing for a weather diary, kept in the second century A.D. by Ptolemy the geographer, records thirty days of rain and twenty of drizzle in a year at Alexandria as against forty-one wet days now.[2] So we are hardly entitled to assume a change in the climate.

Travellers from Alexandria along the asphalted roads to Cairo or Matruh cannot help observing how the occasional run-off from the tarred surfaces of these roads has increased the fertility of the immediately adjacent strips of desert. Where the rest of the countryside is dry and barren, there is generally a line of small bushes and wild plants on either side of the road; indeed, in a good year there may be sufficient growth to hide the unsightly rows of empty tar-barrels which have been left to disfigure the landscape. In Ptolemy's day, the farmers of Mareotis made great use of

[1] At the abandonment of Matruh during the late war, a few cisterns were treated with "bonol," a preparation from fish-oil, designed to render their contents undrinkable. Yet, in 1947, in spite of repeated enquiries at Matruh, I could not find that the local Arabs had noticed anything wrong with their water supply.

[2] Hellmann, G. "Über die ägyptischen Witterungsangaben im Kalendar von Claudius Ptolemaeus," *S.B. preuss. Akad. Wiss.* **13** (1916).

an irrigation system based on run-off by which they concentrated the scanty amounts of rainwater on portions rather than on the whole of their fields. The soil of Maryut is a sandy loam which blows about only too freely when dry and cakes when wet and this they heaped up in wide embankments, 12–15 feet high, from which any run-off might go to increase the yield from the land both within and without the banks. The areas thus enclosed are very irregular in outline; but a roughly rectangular form predominates. Such enclosures with the banks surrounding them are known nowadays as *kurum* (sing. *karm*), literally "vineyards," an Arab name which doubtless preserves the memory of their former use. These *kurum* are



The Kurum south-west of Alexandria

sometimes sited on sloping ground and the gaps in the banks are, as often as not, in their lower sides; so that it can never have been the intention to store water within the basins thus formed. Moreover, there are no traces of ditches dug to lead water from the neighbourhood into the *kurum*. As said above, the purpose of the embankments appears merely to have been to increase by run-off the amount of rainwater reaching the fields beside them.

With the advent of Islam the vine has gone out of cultivation in Maryut,[1] yet the run-off from the banks of the *kurum* still aids in a measure the barley crops of the Awlad 'Ali Arabs round El-'Amiriya and Bahig. Further west there is a group of

[1] This statement must be qualified. At Abu el-Matamir, beside the Nubariya Canal, good wine, both red and white, is grown on the Gianaclis estates.

kurum at El-Dab'a; but that is the last in Egyptian territory. In Tunisia, Ali Bey Shafei found the *kurum* system still in operation in 1950, when he saw "hundreds at Gabès and on the way to Gafsa." [1]

The Pit at El-Saqiya.—Ptolemy Philadelphus (285–246 B.C.) was the first [2] to "cut" a road from Coptos to Berenice to help along the growing trade with India. Thoroughfares from Coptos to Leukos Limen (Quseir), from Caene (Qena) to Philoteras (Safaga) and from Caene to Myos Hormos (Abu Sha'r) followed; all with cleared tracks for waggons and fortified watering points, usually at half-day intervals. If the later Via Hadriana be included, some 1200 miles of track were cleared and fifty odd stations constructed. Wherever possible, a well was sunk inside the station and, in all cases, there were one or more plastered tanks. None of the walls was very deep except the one I am going to mention.

At El-Saqiya, the third station from Caene on the road to Myos Hormos, where a branch track took off for the gold mine of Abu Zawal and the quarry of Mons Claudianus, there was a well—and a deep one. But the site was very strange. Instead of being inside the fort which at El-Saqiya is on a low hill, or in the wadi bed outside where an intermittent supply of water could have been obtained at little depth, the mouth of the well lies in an immense excavation, 60 yards square and 25 feet deep. Well clear of this great pit the spoil from the excavation, some 45,000 tons of greenish marl, lies heaped up in three great embankments to form an enclosure whose fourth side is constituted by the hill on which the fort stands. Inside this enclosure, on the southern verge of the great pit, beside the presumed site of the former waterwheel (El-Saqiya means "the waterwheel") is a plastered tank which once held 20 tons of water, connected by a long drinking trough to another tank of 105 tons capacity, lying further back.

Wilkinson (1822), Schweinfurth (1877) and Weigall (1907) make no mention of a well in the excavation and one must suppose that in their days the site was covered by drift sand. Yet a well was there and, in 1907, it was cleared out by the Department of Mines to a depth of 232 feet. In 1920, I sounded the shaft and reaching bottom at 140 feet concluded that the sides had caved in. Only a small supply of water—about 70 gallons a day—was obtained on reaching the Nubian Sandstone. At the lip of the well the friable rock has been much cut into by the passage of the ancient draw-ropes. Two passages, whose sides are lined with courses of undressed stone, lead down into the excavation from the enclosure. Schweinfurth, who did not know of the well, thought that these were conduits to lead water into the excavation from the wadi when it was in flood. But the terrace on which the enclosure stands is far too high above the wadi bed for that to be feasible unless a canal were dug to take off water from the wadi higher up. Of such a canal there is no trace, nor are there the cones of silt below the passages which their use as conduits would have produced. They appear simply to have been made for the carriers who took marl up to throw on the embankments and were later used by the men going between the well and the fort. The great excavation *may* have been dug to store water in. But it was certainly never used for that purpose.

Its purpose is still doubtful. But, it seems to me possible that, at the commencement of the quarrying at Mons Claudianus and the Porphyry Mountain when traffic on this Myos Hormos road greatly increased and animal lines were constructed outside the stations, the ground at El-Saqiya was found to hold a meagre supply of water, due perhaps to a local cloud-burst. Ignorant of its origin and hoping to hit

[1] "Lake Mareotis," *Bull. de l'Inst. Fouad Ier du Désert*, **2**, 1 (1952).
[2] Strabo, xvii, i, 45.

upon some hidden spring, the high official in charge of the opening of the quarries made use of the labour force at his disposal to make this vast excavation. Later, when the search revealed no spring and whatever supply was provided by the greenish marls was exhausted, a deep well was sunk in the hope of striking water in the sandstone beneath the marl. To an engineer with experience of well-sinking in the oases this would have appeared reasonable; and, at Laqeita, as we have seen, these sandstone beds do contain a good supply. In the accompanying photograph the embankments of spoil are seen in the background, the ruin of the open tank on the verge of the pit and the mouth of the well-shaft below it.

Summary

During the Pyramid Age (2980–2750 B.C.) a large dam was built to store water in the Wadi el-Garawi near Helwan. The breach in it was caused by lack of mortar in its construction and the absence of spillways to deal with an overflow.

The XIth Dynasty (2160–2000 B.C.) undertook much well-sinking on the road to the Wadi Hammamat and the XIXth Dynasty (1350–1205 B.C.) did the same on the roads to the gold mines. In Dakhla, the deep artesian water was presumably tapped before 905 B.C.; but, in Kharga, its exploitation may have had to wait for the Persian occupation in 525 B.C. Collecting galleries for feeble seepages of water were excavated in Kharga, perhaps by the Persians, and near Matruh on the north coast in Roman times. The thousands of cisterns to catch run-off along the coast may be somewhat earlier; and during the Graeco-Roman period wide embankments were made to eke out a deficient rainfall by concentrating run-off on the fields.

About the commencement of the Roman exploitation of the quarries at Mons Claudianus and the Porphyry Mountain in the first century A.D., an immense excavation was made near El-Saqiya on the Myos Hormos road. It appears to represent a search for a non-existent spring.

THE STORAGE AND CONSERVATION OF MAPS

A report prepared by a committee of the Royal Geographical Society, 1954

INTRODUCTION

THE TERMS of reference of the committee were "to draw up ideal standards of map conservation for the guidance of map curators." It was also agreed that the enquiry should include manuscript as well as printed maps, on paper or vellum. The committee later agreed that, besides drawing up ideal standards, it should outline minimum standards within the reach of institutions with limited funds.

In the following report, some general considerations which guided the committee are first set out. The report then deals in detail with the storage and conservation of printed maps on paper, *e.g.* the larger series of national surveys, and maps in current use. The special requirements of archival material are discussed, and the report concludes with notes on the repair of maps.

I. GENERAL CONSIDERATIONS

Ideally, a map should be stored and conserved in the state in which it is issued. If deterioration should, or has, set in, the methods of repair and conservation used should respect its original or existing physical form. It will then be preserved for posterity as nearly as possible as it was designed by the maker.

The committee considers that this principle applies to all maps, irrespective of the material on which they are drawn or printed. In practice, however, a broad distinction can be drawn between maps (for the most part printed and in current use) in working and record collections, and maps of archival importance mainly in record offices. For convenience, therefore, the two are treated separately.

This principle, if scrupulously carried out, would require precautions which may be beyond the scope of a large working collection of maps. For instance, changes of temperature and humidity will cause paper to expand or contract, and these can be controlled at a price. The committee considers that a map library of repute should make every endeavour to approach this principle closely and believes this can be achieved without disproportionate expenditure.

Printed maps

The extent to which this ideal is approached, at least for printed maps on paper, should be related directly to the standard of accuracy of the particular map, and to the requirements of potential users. A motoring map, merely showing the mileage between towns, etc., clearly does not demand the same standard of care as the sheets of a topographical survey from which measurements will be taken directly.

A distinction can also be made between collections which are charged with preserving maps for posterity, and those in which maps may largely be regarded as "expendable," *i.e.* are discarded when out of date or worn out, and replaced by current issues. For these latter the minimum standards of storage would be appropriate.

For the above reasons, the committee considers that maps on paper should be stored flat as issued, either vertically or horizontally. Maps which are published

folded with or without covers are also often better preserved unfolded and flat. Certain editions of the O.S. One Inch, for example, if kept folded as published, tend to turn brown along the folds. It is also considered that in some circumstances it may be permissible and convenient to dissect wall maps, and other maps in rolls, and to store as flat sheets, but this certainly does not apply to maps which are essentially rolls, such as Chinese maps, and many of archival value. If maps must be folded, they should be dissected and mounted.

The committee wishes in particular to emphasize the necessity of storing the sheets of national topographical series as issued, and of avoiding cutting or folding them. These are scientific documents for the surveyor, geodesist, geographer and others, and should be treated accordingly. Folding or dissection cannot but reduce their value by hindering their efficient use. It does not appear to the committee that this demand conflicts with the duty of the national libraries to preserve their collections for posterity. Many of these series are now printed on stout paper, and with proper care they should not suffer from reasonable use.

Maps in archival collections

In considering the preservation of maps in archival repositories, certain factors have to be borne in mind which do not apply when discussing non-archival collections. Because of their archival quality, these maps must be preserved for ever, must remain in uninterrupted custody and must be preserved as far as possible in their existing format. These considerations are set out later in the report, where questions of conservation and repair of maps are also more conveniently discussed. In a non-archival map collection possessing, for example, early manuscript maps or charts on vellum or parchment, the procedure outlined in section III should be followed.

Atmospheric conditions

With maps, and more especially archival maps, it is essential, if damage by damp or organic growth is to be avoided, to have regard to the atmospheric conditions. The temperature should be kept steady between 55° F. and 60° F., without rapid rises or falls. The relative humidity should not exceed 65 per cent. Ventilation is equally important. The use of ventilating fans and air bricks to provide a constant stream of moving air, or possibly an air-conditioning plant, should be considered where conditions are adverse.

The deleterious effects upon maps of persistent exposure to light, in storage and on exhibition, should also be borne in mind.

II. THE STORAGE OF PRINTED MAPS

From the replies to the committee's questionnaire, it appears that the following are the chief methods of storing sheet maps in use in Great Britain.

(1) Flat in horizontal drawers.

(2) Unfolded, in vertical files.

(3) Other vertical and suspension methods.

(4) In Solander boxes,[1] portfolios, guard books, or similar containers, folded where necessary.

(5) Folded, in vertical files, pigeon holes, etc.

The first method was used for all or some part of the maps in most collections,

[1] Boxes in the form of a book, the sides being hinged to open out flat.

and was stated to be the method preferred in the majority of cases. One or two libraries use the second method and find it satisfactory, particularly for long series of uniform sheets, as it allows the index or sheet numbers to be consulted with ease, and the required map can be extracted, without moving a number of other sheets.

On the question of metal *versus* wooden cabinets, the former have every advantage. They will withstand harder and longer wear, the drawers are less likely to jam and to require force to open and shut, with consequent damage to the maps. What is important, especially in archival repositories, is that they are free from the risk of dry rot or worm, and reduce the risk of fire. The only advantage of wooden cabinets is their cost; on present prices, metal cabinets would cost approximately 50 per cent. more.

Horizontal filing

Standard sizes of drawers are double-elephant (approximately 43×31 inches) and antiquarian (54×32 inches). The former will accommodate most of the large topographical series, and smaller maps may be placed in two piles. The depth of the drawer should not be greater than 2½ inches, otherwise it is difficult to get at the lower maps, and the drawer is too heavy. Each drawer should have a hood at the back which should extend for at least 9 inches, and its fore-edge should be visible when the drawer is fully open. There should be a clear space between the top of the pile of maps and the bottom of the drawer above.

Each drawer will hold approximately one hundred sheets. Stiff manila folders must be used to sub-divide the contents into convenient units, to reduce labour and damage in handling. It is desirable that the metal drawers should have ball-bearing suspension, and a device to lock the drawers in the open position.

Some fittings to keep the folders and maps flat in the drawers are necessary. These may be flaps inside the drawers, wooden or leather covered metal battens, or weighted American cloth over the whole area.

The front flap when raised should fall outside the drawer; if it does not, it hinders access to the drawer. If the front of the drawer is hinged, "scooping" is avoided in handling maps.

Cabinets carrying such drawers may be built to any given height. The upper ones may contain maps which are not often required, though this is not always easy to arrange. If the maps are being constantly referred to, the top drawer should not be more than 5 feet above floor-level. The ideal unit will have its top at a convenient height to form a table on which maps can be spread. In arranging a lay-out, provision should be made for some, at least, of the cabinets to allow this. If a large uniform series has to be housed, such as the new Ordnance Survey Six Inch map on national grid lines, it may be practical and economical to order cabinets whose dimensions suit the particular series, rather than to fit the maps to existing cases, merely to preserve uniformity.

Vertical filing

Maps may be filed vertically, unfolded, in files similar to ordinary letter files, in "plan-files," where the maps are in folders which are compressed by springs and move backwards and forwards on ball-bearings, and in files employing various methods of suspension.

The largest steel vertical file now available as a standard product will take maps up to 26 inches wide by 21 inches high. This has been found very useful in the Royal Geographical Society, as it will take many series, such as the Ordnance

Survey Six Inch map, unfolded. Another useful size, made for X-ray photographs, is $18\frac{1}{4} \times 14\frac{1}{2}$ inches. Compared with horizontal storage, unit for unit, this method is economical of storage space. It is not necessary to mount the sheets. They should be put in linen-hinged strawboard folders, about 100 sheets in each folder. Each drawer should have at least two subdivisions, otherwise the weight of maps may make it difficult to extract sheets from the back. The drawers should not be filled too full, or the tops of the folders tend to get torn.

Merits of horizontal and vertical filing

In general, horizontal filing is to be preferred, but it is essential that the precautions, which are enumerated above, should be observed, to avoid damage to the maps. Vertical filing is only satisfactory for long series of uniform sheet size, and where the sheets are small. In these circumstances, it affords economy in storage space, and reduces friction in handling the sheets.

Other vertical and suspension methods.

"Planfiles" and vertical suspension systems do not as yet appear to be extensively used in map libraries. They would seem to be best suited for holding drawings and plans to which frequent reference is made. One feature of some of the suspension systems is that it is necessary to attach a strip of tough paper to one side of the map, by which it is suspended.

Portfolios

In the new map department of the Bibliothèque Nationale, the majority of the maps are kept in portfolios, which are stored horizontally on roller shelves. The portfolios are in five sizes, the largest being approximately 50×34 inches. The stacks are 4 feet 6 inches high, with nine or ten shelves. The portfolios are carefully made, with interior linen flaps and ties, making them dustproof. In effect the portfolios correspond to the drawers of a cabinet. To consult the maps, however, it may be necessary to remove the portfolio to one of the tables provided, and more time and effort are required to open the portfolio, find the map and replace the portfolio on the shelf. Against this extra demand on labour, is to be set a saving in floor space. This method is probably most justified where large numbers of maps, which are not frequently referred to, have to be stored.

Solander boxes on shelves are convenient for storing smaller maps and those which are being kept folded, for one reason or another. To take standard topographic series without folding, they would be an inconvenient size to handle, and for reasons already set out, the committee is opposed to folding this type of map.

Wall maps, maps on rollers, etc.

In accordance with the general principles of this report, maps of this character should be preserved in their original form. It is arguable that wall maps formed by mounting a number of sheets might without harm be separated into component sheets and stored flat, especially if they are in a working collection of maps where they will be used for reference only. But in most cases, the wall map may well be required to fulfil the purpose for which it was designed, and consequently should not be broken up. Certainly no maps of an archival nature in roll form should be cut up for purposes of storage.

The treatment of maps on rollers should follow where appropriate the recommendations in the section on archives below. They can be hung vertically from hooks, or kept horizontally in racks or shallow troughs fixed to the wall, or if size

permits, as rolls in the ordinary drawers. Small maps which have become rolls fortuitously should be stored flat.

Minimum standards of storage

The minimum requirements, given suitable atmospheric conditions, should be protection from dust, and easy accessibility. These can be secured by putting the maps in portfolios, large envelopes, or brown-paper parcels, up to 100 sheets in each, and storing them on simply constructed wooden racks or shelves. Alternatively, the maps might stand in piles on a stack, the front of which is covered by a curtain. The committee, however, strongly urges that, wherever possible, wooden cabinets with horizontal drawers should be regarded as the minimum acceptable standard in map storage.

Mounting

Maps on less durable paper, especially if in constant use, should be mounted on linen or other fabric. Many series today are printed on sufficiently tough paper to stand up to reasonable handling, so that the proportion to be mounted may not be large.

All maps which are to be folded should be dissected and mounted. Mounted maps should not be folded without dissection, as the paper will crack. Maps on photographic paper should be lined to prevent tearing and cracking.

Mounting the sheets on linen or other fabric will prolong their life, but it may also distort them to some degree. This does not appear to be a serious objection. The committee understands that where extreme precision is required, it is the practice to calculate the theoretical dimensions of the sheet in question and to apply an appropriate correction to measurements made on the map.

Repair

Map repair in a map library will be confined largely to mending torn maps. This is best done by mounting the whole map. Transparent cellophane should not be used for repairs on the face of the map, as it becomes discoloured and spoils the paper.

For older or more valuable maps, the methods recommended in the books quoted in the archival section should be followed.

Lamination

A method of preserving documents which is extensively used in the United States is that of lamination. The process consists of putting a map "between two slightly larger sheets of cellulose acetate foil, and placing them in a press, where, by means of heat and pressure, the cellulose sheets are fused with the map."

While the committee understands that professional opinion in this country is divided on the merits of this process, the technique is capable of extended application to maps. The comprehensive report upon it which the U.S. Bureau of Standards is to issue in 1955 and the results of the experience with the equipment to be installed in the British Museum will be awaited with interest.

III. PRESERVATION OF MAPS IN ARCHIVAL COLLECTIONS

General considerations

A distinction must be made between those maps, both printed and manuscript, which have archival quality and those which are working reference copies or merely

part of an artificially assembled group of documents. In all matters of storage and conservation, due regard must always be paid to the archive quality of the map and every precaution taken to ensure that this quality is not impaired in any way. For this reason, there must be strict control of the production of maps for inspection and supervision during consultation. The maintenance of the principle of custody, *i.e.* of keeping by an unblemished line of custodians—either the original custodian or his legitimate successors—also requires that this control and supervision should be carefully exercised. In the repair of maps, all work should be carried out in accordance with archive practice and principles. It may be considered worthwhile, with archival maps in bad condition through previous faulty care or constant use for reference purposes, to aid preservation by the use of duplicate copies or photographic reproductions.

Storage

While many archival maps are of such a format that it is practical to store them in map cabinets, horizontal or vertical, in portfolios and solander boxes, there is an equally large, if not larger quantity, almost invariably in roll form, which requires storage in a different way. These maps of outsize format must be on shelves and be afforded some minimum protection by an outer cover to prevent damage by dust, impure air and wear and tear in production. This protection can be afforded by attaching a "guard" to the backing of the map, *i.e.* attaching by paste or stitching, a stout unbleached linen strip of the same width as the map, and then pasting the guard to a cylinder of straw- card- or chip-board of 4 inches diameter and slightly wider than the map; another guard, several inches wider, should be attached to the other end of the map, which is then rolled round the cylinder. The bottom guard then covers the outside of the map and the loose ends can be tied with tape to form a relatively dust-proof cover. Very large maps may be fitted with a cylinder at each end, and may be rolled from one to the other during consultation. Alternatively, the map can be placed inside a tube, which may have one end blocked and a slip-cap at the other or slip-caps at both ends. Metal tubes, japanned or not, which were formerly much used for tithe maps, have the disadvantages of sharp edges, which may cause tearing, and there is always the danger of damage through rusting.

The variety of racks and shelves on which these outsize maps can be stored is great, depending on individual resources and circumstances. The main point to be avoided is allowing the weight to be taken by one end resting on the floor. Care should always be taken when these maps are removed or replaced on racks that their ends or sides are not pushed against the wall.

Parchment maps should not, if it is avoidable, be stored vertically in unrolled form, as the weight of the document and the roller, if there is one, may cause distortion.

Many of these outsize maps are received with wooden or other rollers attached to them; only light wooden rollers should be retained as the heavier ones tend to damage the map in rolling and unrolling. Where rollers are retained, they should be inspected for woodworm and, if necessary, treated against it.

The storage of archival maps in a folded state is generally to be deprecated although, in certain cases, this is unavoidable or permissible. Where the map has been deliberately prepared from the first in folded form or when it is a part of a volume, then it is left folded, provided that it suffers no damage thereby, but in general storage should either be flat or in roll form in the interests of preservation.

Occasionally the attachment of an archival map to a document may present

problems of storage which can only be adequately solved by the separation of map from document and the storage of each item individually. In such cases, a note of the separation and the reason, *e.g.* "for better preservation"—should be certified by the custodian and dated. In the case of official maps, *e.g.* tithe maps, it might be well to seek the opinion of the Master of the Rolls before taking action. It may be desirable where such separation is practised to any appreciable extent to use a special stamp recording this separation with a note of the Master of the Rolls' authority.

Mounting and repair

Archival maps should never be dissected for ease and convenience of storage. In all cases, there is a minute loss by cutting and in many cases, especially with parchment, the sections will never register with each other again. Above all, an action has been taken which will cause the value of the map as legal or historical evidence to be suspect. The custodian who cannot store a map in one piece because of its size might well consider that the proper course of action in such circumstances is to transfer it to an authorized repository, which can do so.

Archival maps should be repaired according to the normal practice of archive repair. The main differences will lie in (*a*) the special equipment needed for repairing very large maps, and (*b*) the choice of material for backing them. Linen, holland and jaconette are normally used, but other materials are acceptable provided they are durable, flexible, strong and chemically inert.

The following general points should also be noted.

Paper maps should be repaired with hand-made repairing paper, and silk gauze where necessary; parchment and vellum maps with parchment and silk gauze. Pure flour paste should be the only adhesive used.

Wherever the ink and pigment permit, maps may be treated with size, made by boiling down parchment clippings and waste. This will strengthen the material and "fix" the surface.

Lamination is not universally applicable to maps since many are too large for the machines so far available.

With regard to the repair of archival maps, the section on repairs by Sir Hilary Jenkinson in his 'Manual of Archive Administration' (new revised edition, 1937, Lund Humphries), pp. 66–75, and 'Local Records,' edited by F. W. Steer and L. J. Redstone (Bell, 1953), chapter XII, should be consulted for the archivist's criteria and procedure.

IV. PRECAUTIONS WHILE MAPS ARE IN USE

The first requirement is adequate table-space, so that the map can be spread out flat, and damage by folding or crushing avoided. The edge of the table may have a slot, to take the lower part of large sheets when the upper part is in use. Covered lead weights should be provided to keep the map flat.

The second point is prevention of damage to the surface of the map when in use. If the map is valuable, it should be covered by a sheet of transparent material. The ideal to be aimed at is that the surface shall at no time be handled. Tracing should be carefully controlled: maps should only be traced through a transparent cover, and if possible tracing tables, lighted from below and designed to prevent the map from being unduly heated, should be provided. The use of ink should be allowed only under safeguards, and ink-pots should not be placed on the tables.

Maps of special value can be preserved from damage if photographs or photostats of them are available for the use of students.

V. CONSTITUTION OF THE COMMITTEE

This report was prepared at the instance of the Library and Maps Committee of the R.G.S. by a committee representing the principal types of map collections. The members were Dr. Edward Hindle, F.R.S., chairman (Royal Geographical Society); R. A. Skelton, deputy chairman (Map Room, British Museum); Col. H. Bagot (Ordnance Survey); Professor W. G. V. Balchin (University College, Swansea); P. K. Clark (Directorate of Military Survey); H. R. Creswick (University Library, Cambridge); P. de Paris (The Library Association); Roger Ellis (British Records Association); E. J. S. Parsons (Map Room, Bodleian Library); L. N. Pascoe (Hydrographic Dept., Admiralty); A. O. Stickings (Directorate of Colonial Surveys); Peter Walne (Society of Local Archivists); W. W. Williams (Dept. of Geography, Cambridge); E. H. Williamson (British Standards Institution); G. R. Crone (Royal Geographical Society, Secretary of the Committee). The first draft of the report was drawn up by a sub-committee, on which were Professor Balchin, P. K. Clark, E. J. S. Parsons, Peter Walne and G. R. Crone.

The committee was assisted in its work by the replies to a questionnaire received from twenty-five libraries and map collections, and wishes to express its thanks for this cooperation.

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GEOGRAPHY IN EDUCATION

A report prepared by the Education Committee of the Royal Geographical Society 1955

FOREWORD

In 1950 the Royal Geographical Society published a memorandum prepared by its Education Committee on "Geography and Social Studies in Schools." This memorandum was fully endorsed by the Geographical Association and reprinted in its journal *Geography*. This statement was written to meet what appeared to be a possible danger to the proper position of geography in education. This danger seems to have lessened; certainly the circumstances under which the memorandum was published no longer obtain. Rather than reprint it, therefore, the Council of the R.G.S. requested its Education Committee to prepare a statement on geography in education, such as might be helpful to all those interested in the subject. It was felt that a concise statement of the nature, purpose and value of geography, as understood by the Royal Geographical Society and the Geographical Association, might be useful to heads of schools, principals of colleges, education authorities and, indeed, to all those concerned with the field of education, and also to those engaged in the wider sphere of the professions and business who may employ, or consider employing, men and women with a geographical training.

The statement which follows was prepared by the Education Committee of the R.G.S., acting in the first instance through a Sub-Committee consisting of Professor W. G. East, Mr. R. C. Honeybone, and the Chairman, Dr. E. W. H. Briault. It is now published with the approval of the Council of the Royal Geographical Society and the Geographical Association.

JAMES MARSHALL-CORNWALL,
President, R.G.S.
S. W. WOOLDRIDGE,
President, G.A.

I

ONE OF THE outstanding features of recent educational developments has been the rise of geography as a well established discipline in schools and universities alike. The number of professorial chairs of geography in this country and in the Commonwealth has steadily increased, so much so that all except one of the Universities of the United Kingdom now has at least one Professorship in geography; London has as many as six. Moreover, the university geography departments in most instances are called upon to deal with large numbers of students for honours degrees in as many as three Faculties. This expansion at university level has as its basis and source the firmly established position of geography in schools, where, as Sir Cyril Norwood said in 1946, geography is an essential part of any well considered course.[1] The number of candidates offering geography in the General Certificate of Education reflects this position; for at ordinary level, geography is numerically among the first four subjects. At advanced level, the proportion of candidates offering geograhpy is relatively not so high, though it has increased considerably in recent years. Despite the handicap of few Open Scholarships, the subject clearly has a very important place among sixth-form studies, and the Society is glad to observe

[1] *Geography*, **31** (1946) 1–9.

the gradual increase of open awards in geography at the Universities. In training colleges for teachers, the teaching of geography has undergone important changes in recent years, and geography is now one of the most popular special subjects.

This widespread recognition of the interest in, and more particularly of the value of, geography in the whole field of education is reflected in the improved status of the subject in the Civil Service examinations, where, for the Administrative class, geography now ranks equally, from the point of view of marks, with other major subjects. The Society's memorandum "Careers for Geographers" [1] has already drawn attention to the widening fields of employment open to well qualified geographers, and there is increasing evidence that the broad educational value of a training in geography is being recognized in industry and commerce, as well as for specialized posts. As that memorandum pointed out, a geographical training has a general value over a wide field of professional and business occupations, for the geographer "develops the particular intellectual skill induced by the habit of seeking correlations of varied and apparently disconnected phenomena, and of drawing together the data of natural and social investigation into a synthetic whole."

To many people who were taught in an outmoded way, frequently by teachers without sound training in, or adequate understanding of, geography, such progress seems difficult to understand. It is the purpose of this paper to account briefly for the present position of geography. The principal reasons are the recognition of the true nature of the subject and hence of its intrinsic importance in the whole field of education.

Even primitive peoples reveal some geographical understanding, for on this depends their ability to eke out a living and to survive in environments fraught with danger. They have to know where to obtain water, even in times of drought; where to find the best hunting grounds at different seasons of the year; where crops can be sown; and where to live in relative security. In other words, they have to have, of necessity, as modern geographers would say, "an eye for country." They have to know the local terrain and the effects of the rhythm of climate, for only so can they ensure the necessities of life and survival.

The science of geography, as we now know it, is largely the intellectual product of the last hundred years, notwithstanding the remarkable early contributions of Classical and Moslem writers. Early in this century the work of Paul Vidal de la Blache, who inspired a whole school of geographers in France, reflected how much progress had been made. Following the lines along which he himself worked, French geographers applied themselves to the close study *inter alia* of their own country. By sketch-map, diagram and written description, they recorded the many facets of the landscape, both physical and human. After careful investigations in the field (which might of course be both rural and urban), they were able, by drawing out the special character of each area, to distinguish one region from another by means of vivid and synthetic description and interpretation. This understanding and differentiation of regions is the essence of modern geography, and the subtle combination of the physical and human elements of the landscape, the latter being in large part legacies from the historical past, have been well described by Vidal de la Blache himself: "A geographical individuality does not simply result from geological and climatic conditions. It is not something delivered complete from the hand of Nature. The idea we must begin with is this: a country is a store-house of dormant energies, laid up in the germ by Nature but depending for employment

[1] Published in *Geogr. J.* **115** (1950) 93–6; revised, April 1954. Reprinted in *Geography*, **39** (1954) 283–6.

upon man. It is man who reveals a country's individuality by moulding it to his own use. He establishes a connection between unrelated features, substituting for the random effects of local circumstances a systematic cooperation of forces. Only then does a country acquire a specific character differentiating it from others, till at length it becomes, as it were, a medal struck in the likeness of a people." (P. Vidal de la Blache, 'The personality of France,' trans. E. C. Brentnall, page 14.)

II

From this discussion, points emerge which help to explain the present increasingly high standing of geography at all levels. The first is that geography is a study which helps to satisfy the natural desire of men (and children) to know more about the world they live in. Part of its function is to satisfy the interest of men in what places and peoples are like and why they are so, and in the significant differences between places and peoples throughout the world, a function not performed by any other discipline. The satisfaction of this natural curiosity about unfamiliar people and places, which geography provides, is a most important means by which international understanding and tolerance may be developed.

A point of major importance concerns the subject as an intellectual discipline. There are several stages in the process of geographical thought. Keen and accurate observation is the first, followed by the second stage of recording this information in various ways, but particularly by means of maps and diagrams. When these essential tasks have been done, it is necessary to go on to the third and more difficult stage of analysis and interpretation. The multiplicity of observed facts must be subjected to selection, evaluation and scientific analysis, for the varied data from the natural and the human spheres must be understood in themselves before the essentially geographical task of interpreting their inter-relationships can be tackled. It is at this fourth stage that the geographer makes his special contribution to human knowledge, in gaining a synoptic understanding of the extent to which, and the ways in which, phenomena (themselves the concern of separate natural and social sciences) occurring together on the earth's surface are causally interrelated. This "evaluation of the place factor," as Mackinder called it, gives geography its characteristic outlook.[1]

The geographer's synoptic view may be taken in the field, in the map room or in the library. But he cannot desist until he has understood the "personality" of the region. This further task is that which led Mackinder to speak of geography as an "art" as well as a "philosophy." This task is to present the picture which he has analysed, and the synthesis which he has made in the form of a description: a description which will be partly literary but which will also rely to an important extent upon the use of his characteristic mode of expression, the map. It would be a useful and salutary exercise for one who doubts the disciplinary value of geography to go out into the countryside with a geographer and to hear him describe, explain and characterize an area; for the well trained geographer can depict a region as does a historian a period in history. To achieve a full interpretation, the geographer has to observe and to select from a wealth of frequently bewildering detail. He may use the facts which in themselves properly belong to other disciplines, and it is only the balanced skill of a trained and experienced geographer that enables him to select his facts and to synthesize his region. In one place, for example, he may concentrate on building materials, and the architect may object that he is trespassing on his

[1] *Geography*, **27** (1942) 122.

preserves; but the geographer is not so much interested in the construction of any one particular house, as in the distribution of particular types of houses as a reflexion of the human response to environment; or, to quote, he is interested in "the natural (including human) phenomena in their natural groupings or contexts with a view to perceiving the causal relations between them."[1] This need to consider widely varying facts is both the strength and potential weakness of geography. In the hands of the unskilled, it can result in a mere hotchpotch of unrelated detail; in the hands of the skilled, with the selection of significant fact, it becomes a revealing synthesis.

There has been a further danger in the past that the varied details of the geography of an area may have been regarded by some teachers as suitable for memorization in themselves and unconnectedly, rather than as the vivid means by which a realistic and synoptic picture may be gained. A proper stress on the importance of interrelationships and the synoptic view as characteristic of the geographer's outlook overcomes this danger.

The geographer, however, goes further than the analysis and synoptic description of individual regions, for the final stage in the process of geographical thought is that of generalization. The world is the geographer's province, just as much as the tiny local region, and to complete his task he has to try to outline a picture of the whole world, made up as it is of different but interdependent parts. Valid and worthwhile generalizations about major regions of the world, and about the world itself, can come only after the details of specific areas have been thoroughly absorbed. It has been a serious fault in the teaching of geography in British schools that, far too often, dry and meaningless generalizations have been presented to children before the exciting and interesting details. So long as climate, for example, is approached as a legitimate form of generalization arising from a vivid appreciation of varieties of weather, geography is rightly served. But theoretical explanations and generalizations about climate, divorced from a realistic knowledge of weather at particular times and in particular places, are to be deprecated. The geography which is gaining such prominence today puts more emphasis on the earlier stages of observation, recording and interpretation, without omitting the final and important stage of generalization.

III

This brief discussion of the value of geography as a mental discipline suggests a major reason for the important place which the subject holds in education. It is worth while emphasizing that, other things being equal, a subject which has a discipline of its own is preferable in any type of school and at any level of study, however advanced, to a body of knowledge which has no such discipline. "Other things being equal" is an important qualification, meaning that a subject must also justify its inclusion in the curriculum by its content and its methods.

Geography has an incontrovertible claim to inclusion in the curriculum on the ground of content alone. Its facts are contemporary and real; they are significant for, and relevant to, the life of every individual and every community. Some are directly connected with children's experience, but they are not all confined to the narrow or local. In a school course, local study by itself, too long continued, may easily become dull, and by building up a mass of facts in themselves of little significance, pedestrian and unedifying. Many of the facts of geography, however, are sufficiently outside the children's ordinary range of experience to stimulate and

[1] Wooldridge, S. W., and W. G. East. 'The spirit and purpose of geography,' London, 1951.

excite, but not so abstract in the earlier stages as to be outside their grasp. The very variety of geographical fact and of the regions themselves is interesting and a stimulus to study. The economic and political facts of geography, appreciated by themselves in their physical setting, are ones which every future citizen should know and understand, for they relate directly to his daily life and livelihood. What serious newspaper or periodical can be intelligently read without a fair background of geographical knowledge? What understanding of international problems or of the internal problems and economics of one's own, or any other country, can be gained without a foundation of such facts?

Teachers, realizing the necessity for an education that is, at least in part, a preparation for living in a community, and in a nation set among many interdependent nations, see that in geography their teaching can remain significant and useful, and that their pupils are helped by it towards an understanding that each region of the world has its own particular problems and opportunities which are conditioned by the geographical environment. Some such understanding can enliven and give new meaning to statistical material which without it may tend to seem unreal. It is virtually essential to the proper study of at any rate some aspects of history, as is an appreciation of the importance of historical factors to the proper study of geography.

Geography occupies a unique position in that its subject matter involves a careful synthesis of facts drawn from the humanities and the natural sciences, for the landscape is clearly the outcome of natural processes and of man's handiwork. The convenient, but artificial, divisions of the whole field of knowledge into separate subjects of the curriculum gives rise to anxiety in the minds of some teachers. They may recognize in geography a centripetal subject capable of performing a unifying function, and one which helps to offset any narrow and premature specialization.

In terms of method, geography also justifies itself by its active approach to learning, and by the stimulating variety of the ways in which it may be pursued.

Geography is essentially exploratory: it is an active and a practical subject in that its study involves going and finding out. Even though the main outlines of the map of the world are now known, the total geographical complex, especially in settled areas, changes so continually that geographical description, if it is not to be out of date, must be based on continually renewed "exploration," that is, first-hand study out of doors. Much additional geographical material is to be found in maps, statistical data and a wide variety of books.

Whether in the field studying the local area, or in the classroom studying a region too far away for direct investigation, the student must still pass through the stages of observation, recording and interpretation. In the classroom, large-scale topographic maps, pictures and other devices, including the blackboard and the globe, can be used to present the real landscape, and the mental processes involved in their study are similar. By these active methods, children are stimulated to think for themselves and by approaching the study of other peoples through the large-scale study of what is "local" for those peoples, to appreciate the connection between such studies and their own local studies. There is no doubt that the recent phenomenal increase in the use of large-scale maps and pictures in schools has done much, not only to popularize the study of geography with pupils and teachers alike, but also to stimulate its function as a rigorous discipline. The teacher who either continues to regard himself as a fountain pouring out streams of facts to be memorized without understanding, or bores his passive pupils with films and pictures

ad nauseam, contributes neither to the spirit and purpose of geography in particular nor to education in general. Fortunately, such teachers are becoming fewer. Instead one may find pupils, of whatever age and ability, actively engaged in an exploratory spirit and stimulated by their teachers to the intellectual task of interpretative and synoptic study to whatever degree their intellectual powers permit. At training college and university level also, great importance is attached to field study and to the interpretation of small areas by means of large-scale maps and other material. The subject is both exploratory and scientific in character and its intellectual discipline calls forth the full powers of students of all ages.

The map is the basic tool of the geographer, and, while few geographers become geodesists or professional surveyors, all must understand the principles on which surveys are made, and as cartographers they must be aware of the degree of precision necessary in relation to the purpose for which the map is required. In some parts of the world a geographer may find it necessary to execute reconnaissance surveys; but for my geographer, the making and use of other maps with a view to discussing the distributions they represent is peculiarly a part of his characteristic technique. Any educated person should be able at least to read and, if possible, interpret a large-scale map such as the Ordnance Survey one-inch or 1/25,000 map. Such ability, besides being of straightforward practical value, can greatly enhance the pleasure of travel on foot or otherwise, and acts as an encouragement to get out and explore the countryside for oneself.

The power to make some geographical interpretation of an area from large-scale maps is part of the essential discipline of geography. The difference between the amount of information and the understanding of it which a geographer can get from an Ordnance Survey map, and that which a person with no true geographical training can get, is very great. Geography calls for the use of maps of all kinds of scales, types and areas. The familiarity gained from such use, especially if linked with some understanding of the limitations of small-scale maps imposed by the type of projection and other factors, is of great practical value to any thinking person. It can, at the very least, prevent him from being misled by some newspaper or magazine maps, which sometimes omit a scale or choose an unsuitable projection or use unsatisfactory symbols.

The modern development of field studies is a very significant aspect of geography today, and one which gains a ready response throughout the whole range of education from the primary school to the undergraduate and post-graduate student. First-hand study in the field is recognized as an essential part of the discipline of geography. The training of an eye for country is a fascinating, as well as an essential, part of a geographical education. The combination of the powers of description and of interpretation result in a degree of understanding which gives play to intellectual ability of a high order, even though valuable training of this kind can be given and enjoyed at a much simpler level. Direct observation in the field is in any case a pleasant and stimulating form of education. Moreover, it is one in which the whole complex of the landscape is necessarily seen as a whole, so that the convenient though artificial divisions between subjects which are made in the school or the study are seen in proper perspective. Field study of an interpretative kind can greatly enhance the aesthetic appreciation of the beauties of scenery, and understanding makes recollection more ready. "By what right can we withhold a knowledge of how our terrestrial home is constructed, the meaning of its scenery and of the patterns of its sky? The world contains not only factories, farms, railway sidings, market places, etc., but the blue hills on the skyline, the winding valleys

which traverse them, russet bracken-covered slopes, and heather fells, and the ever-changing incident of long and varied coastlines." [1]

Field studies begun as part of geography have become for many the basis of an enduring interest in the countryside, perhaps in some special aspect of it. They have made an important contribution to the outlook of some whose main interests lie in fields such as local history, archaeology, natural history or sociology.

IV

In conclusion, it may be claimed that geography, a study adaptable to any age group, is now established as a discipline which can exact the rigorous exercise of the best minds at any educational level. This has come about for several reasons. It has a broadly philosophical appeal to students, whether interested in the field of Science, Arts or Economics, and serves as an important subject bridging the gulf which sometimes exists between the sciences and humanities. Its methods are active and stimulating. It looks for practical work out of doors, whatever the environment; in the classroom it is also best served by active methods. Its characteristically visual approach calls for the continual use of illustrations and of its own particular technique: the map. It has a content of significant, systematized fact, essential to the educated citizen, both as an individual interested in his own locality, and as a member of a social group which is itself a part of the great world society.

Thus it is now recognized that geographers are contributing something of distinctive value to the discussion of many contemporary problems, whether these relate, for example, to the planning of our countryside, the conservation of natural resources, the team survey of colonial areas, or the complexities of international affairs.

[1] Wooldridge, S. W. "On taking the Ge out of Geography," *Geography*, **34** (1949) 14–15.

THE SAMPLE CENSUS OF AGRICULTURE, NIGERIA, 1950–1

R. MANSELL PROTHERO

IT has become increasingly apparent that adequate collection, study and assessment of data are an essential preliminary to the planning and launching of development schemes in under-developed countries. The myth of the fabulous potential of tropical lands has long been exploded, but they still remain areas with great possibilities of increased production. If, in the exploitation of such possibilities, the needs of increasing population in the areas themselves can be met, and local living standards raised, an important success will have been achieved. But this can only come by gradual development over a period of years, and it is essential that it should not be done piecemeal. Each stage, whether on a large or small scale, should integrate with a full understanding of existing resources and be designed to evolve from existing circumstances.

In tropical Africa particularly there is a dearth of this basic information and the Nigerian Sample Census of Agriculture [1] marked a much needed step in the right direction, since it was the first overall attempt to accumulate statistical data relating to land use and agricultural production in Nigeria.[2] Little attention outside Nigeria seems to have been given to this census; this paper is not an attempt at a full-scale analysis, but the report did suggest a number of comments that may be fairly offered by a geographer.

The decision to take a census resulted from a request made by the Food and Agricultural Organization of the United Nations in 1949, for information to be included in the World Census of Agriculture. The recently created Department of Statistics was asked to organize the census, but the collection of most of the data fell to the lot of Administrative and Agricultural Officers. Without prejudice, this must be regarded as a weakness; the census work was additional to normal duties, and moreover was of a kind only to be adequately performed by properly trained people.

Methods of taking the census.—The vast number of agricultural holdings in Nigeria and their indeterminate and continually changing pattern, together with the high rate of illiteracy among the agricultural population, the diversity of agricultural practices and the shortage of staff available for the work, made a complete enumeration impracticable. The census was organized so that the results were derived from sample counts. The country was divided into thirteen zones or strata based on known variations in food and export crops grown (Figure 1). In the Northern and Western Regions of Nigeria and in the Cameroons the sample counts were taken from a series of "village surveys" conducted by locally recruited teams, each in charge of an administrative officer. Measurements were taken of the areas of land in different categories of land use, and under different crops, and the numbers of livestock were counted. Assessments of crop yield were made in all cases independently by Agricultural Officers and they were not made in the same villages in which the surveys were carried out. Villages were selected for survey in each of the zones by statistical methods, the number selected varying from twenty-five in Zone IV to one in Zone XIII. Only three surveys were made in each of Zones VIII, IX and X. Where villages were too large for complete survey a two-stage sampling technique was adopted, the village forming the first-stage unit and the taxpayer or compound the second stage. The latter was satisfactory in the Northern Region where compounds

[1] 'Report of the sample census of agriculture, 1950–51,' Lagos, 1952.

[2] 'Census of Nigeria,' Lagos, 1931, gives figures for the acreage and yield of principal crops by provinces, but these can be considered only as crude estimates.

generally are of a manageable size. In some of the larger settlements characteristic of the Western Region, where compounds were too large, area sampling was adopted with five-acre plots as the sample unit.

In the Eastern Region land problems are acute, and it was thought inadvisable to attempt "village surveys" for fear of arousing local antagonism. Instead, sample information was collected from "opinion surveys" conducted by Agricultural Officers in the course of their normal tours. These "opinion surveys" were based on assessment and involved no actual survey: they were therefore very much subject to personal judgment. Nor was it possible to select the villages in which they were made. One hundred and thirty villages were surveyed in the Northern and Western Regions and in the Cameroons. Sixty "opinion surveys" were made in the Eastern Region

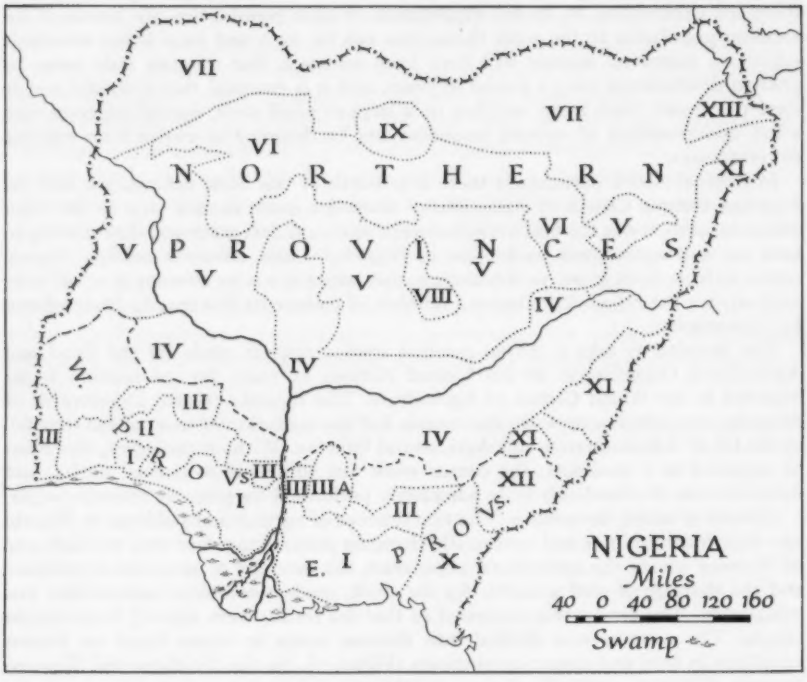

Figure 1

with one full "village survey" in the lowland area of Nsukka Division of Onitsha Province. Altogether these provided a 1 per cent. sample and it is admitted that its smallness was the most serious weakness of the census.

Zone totals were estimated from the samples by the ratio method, using the total number of taxpayers in the zone and in the sample. The same method was used in computing the zone totals from the "opinion surveys," but using the total area of the zone and of the sample. A subsidiary analysis by provinces was made, the provincial totals being computed by the ratio method also, using the total number of taxpayers in the province in the case of the "village surveys" and the area of the province in the case of the "opinion surveys." Information was collected under the following headings:

1. *Population.* The number of male taxpayers wholly or partly engaged in agriculture.

2. *Land use.* The areas in the following categories were calculated: i. land under farm crops; ii. land under (permanent) tree crops; iii. land lying fallow; iv. non-agricultural land (buildings, roads, etc.); v. uncultivated bush and waste land; vi. grazing land (in the Cameroons only).

3. *Area under principal crops.*

4. *Production of principal crops.*

5. *Numbers of livestock.*

Coastal swamp, forest reserves and plantations were excluded from the surveys. In the coastal swamp there is practically no farming, in the forest reserves none, and the area under forest reserves and plantations was already known. *Land under (permanent) tree crops* was defined as land wholly devoted to tree crops and therefore the area estimates of this category do not include the main areas of oil palms since the trees grow for the most part in the bush and on farmland. In future surveys there should be a category *Uncultivated bush with (permanent) tree crops* to meet this situation. In determining *Area under principal crops* allowance had to be made for the practice of planting first and second crops during each farming season. In the census the total area recorded under farm crops corresponds to the sum of the areas devoted to individual first crops and excludes second crops. In the crop acreage and production tables the figures refer to the area and production of both first and second crops.

Problems of land use differentiation.—The census report makes no claim for accuracy in the statistics collected: the value of the work in this initial attempt lay in the experience gained rather than in the results obtained. However, the resulting statistics do reveal some of the problems of differentiating categories of land use (Figs. 2 (a) and (b)). In particular there is little doubt that in the majority of zones the area recorded as *uncultivated bush and waste* is greatly in excess of the true amount, while that classified as *land lying fallow* is too small: this error has resulted from the difficulty of differentiating the two categories. One method used in the census considerably influenced the area of uncultivated bush and waste. Where the total areas of zones computed from the sum of the areas under the different categories of land use were less than the total areas of zones measured from maps, it was assumed that the discrepancy was due to underestimating the uncultivated area and the difference was added to this category.

TABLE OF LAND USE

Village Surveys

Zone	*Percentage under Farm Crops*	*Percentage under Fallow*	*Ratio. Cropland : Fallow*	*Percentage uncultivated Bush and Waste*
I	5·6	16·6	1 : 3	53·0
II	31·0	31·0	1 : 1	7·0
III	11·4	28·7	2 : 5	36·7
IV	7·8	20·1	2 : 3	63·1
V	3·8	3·5	1 : 1	87·9
VI	8·3	12·8	2 : 3	69·0
VII	7·4	3·0	2 : 1	82·0
VIII	25·0	13·3	2 : 1	48·4
IX	41·5	18·0	2 : 1	36·2
X	1·5	7·9	1 : 5	68·8
XI	3·6	1·9	2 : 1	94·0
XII	4·2	38·9	1 : 9	36·8
XIII	5·6	—	—	92·8
All	7·8	11·2	2 : 3	71·4

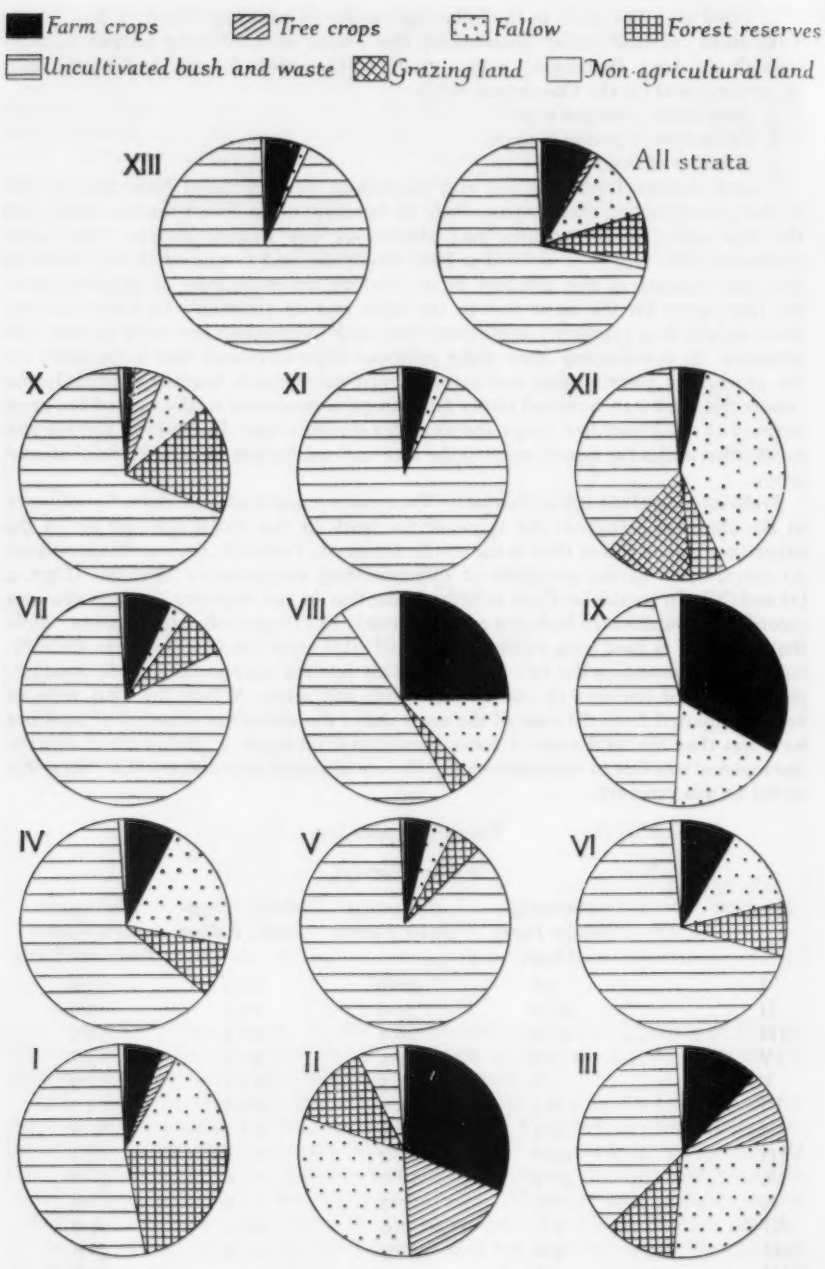

Fig. 2 (a). *Land use: percentage distribution by strata: Information from village surveys*

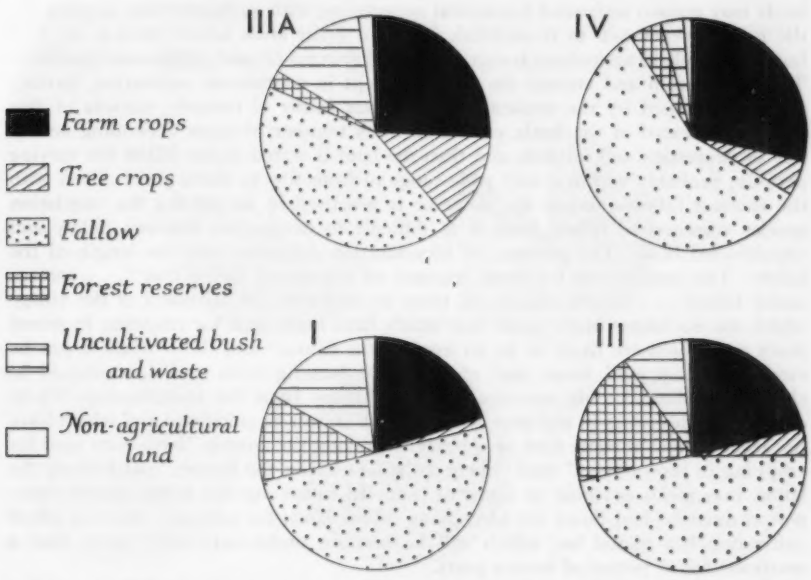

Fig. 2 (b). *Land use: percentage distribution by strata: Information from opinion surveys*

In the Table of Land Use above the ratio of *land under farm crops* to *land lying fallow* is shown as 2 : 1 in Zones VII, VIII and IX. This ratio is within the bounds of possibility for Zone IX, the intensively farmed belt around Kano City, where farming practices to maintain fertility are more advanced than elsewhere in Nigeria. In Zones VII and VIII the ratio is unlikely even allowing for population pressure on the land in some parts of the Jos Plateau and in certain districts of Sokoto and Katsina Provinces. Though fallow periods are short in the densely populated areas, and are becoming shorter as an increasing population and cash crops demand more land, there is still sufficient land available in most areas to allow the fallow period to be at least as long as the cultivation period. This would not be possible if the ratios derived from the figures for Zones VII and VIII were correct and it strongly suggests an under-estimation of the amount of *land lying fallow*. Further evidence of the over-estimation of the area of *uncultivated bush and waste* is provided by the practical difficulty experienced by the Forestry Department in finding land that can be constituted as forest reserves. The aim of the Department has been to constitute 25 per cent. of the total area of Nigeria in reserves, but the achievement up to the present time falls far short of this. This is due in no small degree to the problem of finding land for reservation which the local population will agree is not used at some time in the farming system. If such large areas of *uncultivated bush and waste*, as are shown in the census returns, actually existed then this problem would surely not arise.

The main land use problem in the census was therefore one of accurately distinguishing *land lying fallow* from *uncultivated bush and waste*. The variation in agricultural practices throughout Nigeria makes it difficult to attempt definitions that can be generally applied without reservation. In a few areas where there is no pressure of population on the land, and methods of cultivation are the simplest, shifting cultivation in its true form is practised involving the movement of the community to a new area after farm land has been exhausted. In these areas the deserted

lands may remain unfarmed for several generations with sufficient time elapsing for the natural vegetation to re-establish itself. In other areas where there is no land hunger but where agriculture is more advanced systems of land rotation are practised. The land within and around the village is kept in continuous cultivation, fertility being maintained by the application of various forms of manure; outside of this farms are cleared in the bush, cultivated for a number of years depending on the rate of decreasing soil fertility, and then the land is rested under fallow for varying periods; probably within a very wide range of from five to thirty years. Even with the shortest fallows, unless the observer is practised in identifying the vegetation species common to fallow land, it is difficult to distinguish between fallow and uncultivated bush. The problem of identification increases with the length of the fallow. The instructions for those engaged on the census stated that ". . . acreage under fallow . . . should include all those areas within the farmland of the village which are no longer under crops but which have been used for cropping in recent years and which are likely to be so used in the future" and ". . . when it can be established that land forms part of a definite farming cycle such land should be classed as fallow." This provides a very arbitrary basis for identification. There are very limited areas in any part of Nigeria which can be cultivated and which have not been farmed at some time or another. Applying the criteria "have been used for cropping in recent years" and "likely to be so used in the future," particularly the latter, may mean anything in terms of time. In future surveys some specific time-period must be laid down for identifying fallow land; for example, land on which cultivation has ceased but which will be brought under cultivation again after a *maximum* fallow period of twenty years.

The census report in conclusion suggests that an attempt in the future to define *land lying fallow* should only be made in areas where there is a strict rotational use of the land. The rotational use of land and the length of fallows in Nigeria, though dependent on many factors, is primarily determined by the area of cultivable land available in relation to the numbers and requirements of the population. It is part of the important problem of land-carrying capacity about which so little is known in detail. In future censuses it would seem essential, therefore, that the zones from which samples are taken should be demarcated on a different basis from that used in the 1950/51 census. A more satisfactory zoning of the country would be on the basis of varying population densities. In calculating these densities land which is definitely not available or which is unsuitable for cultivation, for example forest reserves and coastal swamp, should be excluded. The 1952/53 Population Census provides all the necessary information concerning population units, of which the village area is the smallest recorded. For recording *area under principal crops* the basis used for zoning the country in the 1950/51 census was satisfactory as can be seen from the statistical diagrams (Figs. 3 (a) and (b)) illustrating the relative importance of the crops grown in the different zones. They are compiled from the census statistics and generally justify the basis of the zoning.

The census report rightly suggests that in future censuses *waste land*, of which areas of rock outcrop and water are the most important elements, should not be included in the same category as *uncultivated bush* as they bear no relation to one another. *Waste land* will be included in the category of *non-agricultural land*. The area of *uncultivated bush* should then give some indication of the amount of potentially cultivable land. Even in areas of shifting cultivation land which has been farmed over, if only recently abandoned (and therefore not immediately cultivable under existing agricultural practices), is still potentially cultivable if measures are taken to restore soil fertility. Land use data are intended to provide a basis for a planned and, therefore, a better and more thorough use of the land in the future and such improved land use must inevitably entail the introduction and extension of techniques not hitherto employed.

Techniques of Survey.—The census report refers to the difficulties encountered as

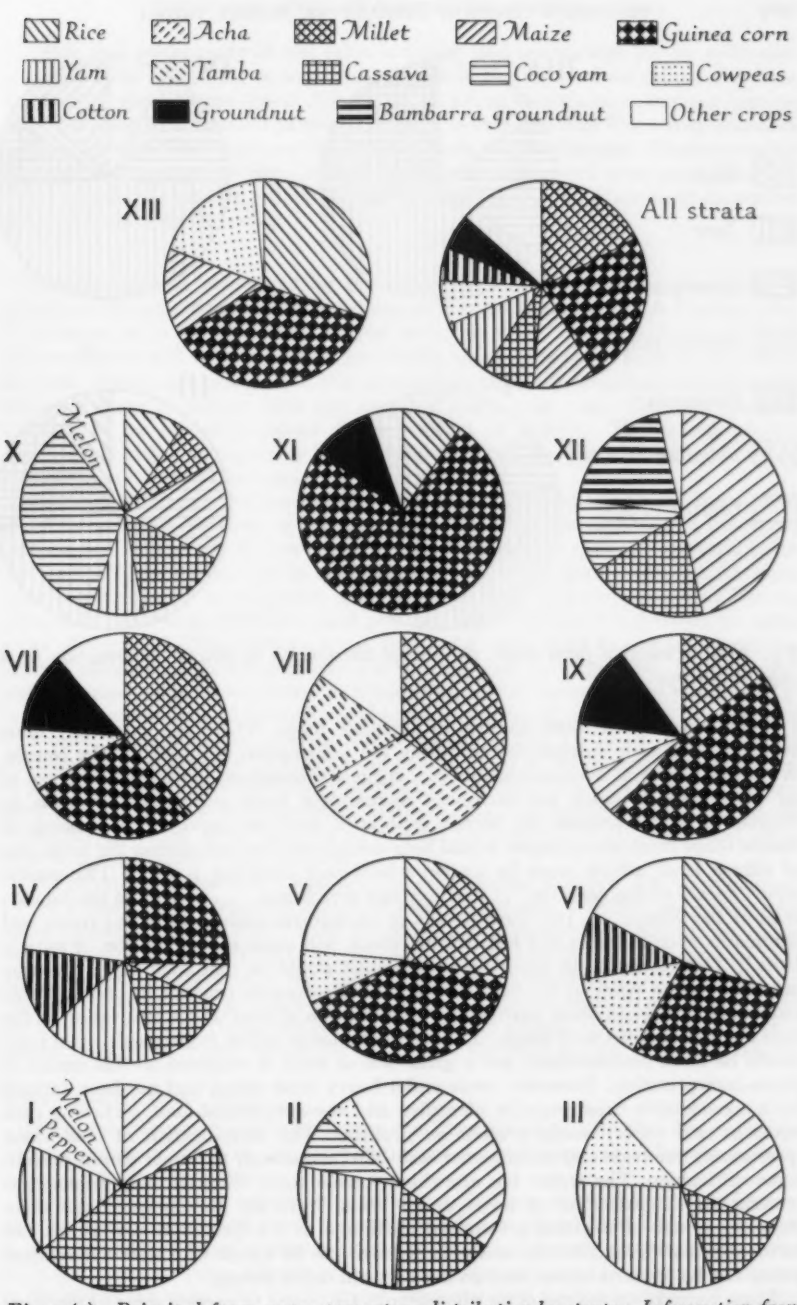

Fig. 3 (a). *Principal farm crops: percentage distribution by strata: Information from village surveys*

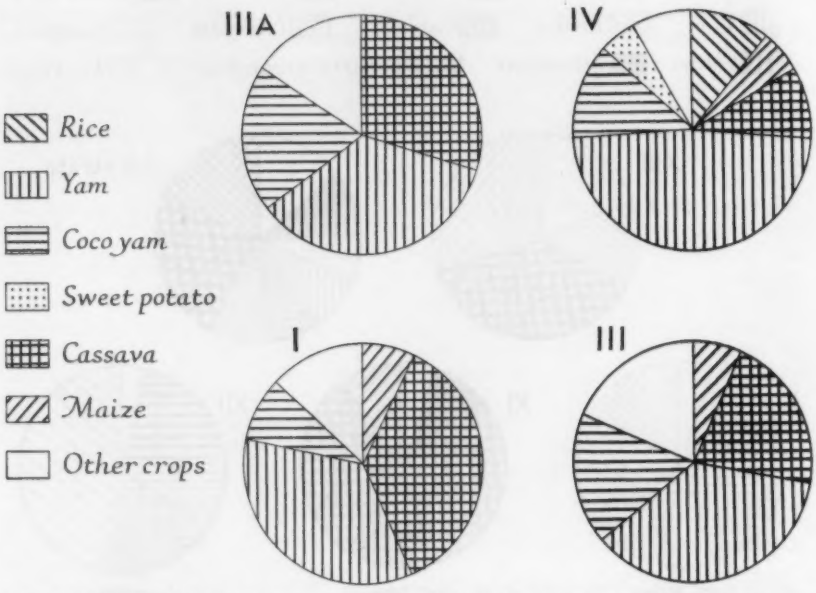

Fig. 3 (b). *Principal farm crops: percentage distribution by strata: Information from opinion surveys*

a result of an almost total absence of adequate maps. There are practically none available on a scale suitable for recording the information required for the census. Ways and means of overcoming this lack suggest themselves, particularly the use of air photographs, which are becoming increasingly more numerous for areas in Nigeria on scales suitable for certain aspects of land use survey. The making of simple maps from photographs would help considerably in calculating the total area of village land, which must be known where area sampling is used. The census report speaks of the need for ". . . an accurate sketch map . . . indicating the boundaries of the village . . . [to] show details of all features such as hills and rivers and landmarks such as paths and habitations, which will assist in the location of sample plots." The advantage in using air photographs would be that such maps could be prepared before work in the field commenced. Reasonable practice in photographic interpretation should make possible the identification of land under cultivation at the time the photographs were taken. The differentiation of fallow from uncultivated bush would be more problematical and a great deal of work is required on this aspect of photo-interpretation. However, areas under heavy bush which had not been farmed for a considerable time could be identified and *non-agricultural land*, including rock outcrops and water, would present no problem. The identification of *land under (permanent) tree crops* and *uncultivated bush with (permanent) tree crops* would present some difficulties. The writer has elsewhere [1] made some tentative suggestions concerning the identification of areas under cocoa from air photographs; the main difficulty is one of devising a standard technique of interpretation. Oil palms can be identified without difficulty and with photographs on a scale of 1/10,000 individual palms can be counted where they do not occur in dense stands.

These remarks on the use of air photographs are meant to suggest some of the ways

[1] Prothero, R. M. "Some problems of land use survey in Nigeria," *Econ. Geogr.* **30**, 1 (1954) 60–70.

in which they could prove of real value in future land use surveys for the collection of census data. Their use to supplement work in the field would reduce the time that need be spent on one aspect of the work. For crop identification, in the collection of data relating to area under principal crops, it is very doubtful if much information (under Nigerian conditions) can be obtained from air photographs. Those available for most areas are on nothing like sufficiently large scales, and even given these (at least 1/5000) the universal practice of mixed cropping and the planting of successive crops would nullify their use.

The general plan prescribed by the Department of Statistics for developing a system for the collection of agricultural census material is admirable. A branch of the Department is to be established to deal with this work, staffed with three senior service officers and with ten teams specifically trained for the collection of data in the field. Over a five-year period it is intended to carry out sample surveys over the whole of Nigeria, dealing with two or three zones each year. This will then be followed by an extensive census similar to that of 1950/51. The results of this enquiry should be incomparably better and the collection of agricultural statistics in Nigeria should then be founded on a secure basis.

Two final comments are pertinent. The need for a general survey and assessment of the agricultural resources of the whole of Nigeria has been stressed in the introduction to this paper. It is, however, essential that machinery should be available for carrying out detailed surveys in small areas that may be *thought* suitable for some form of agricultural development. The stage has not yet been reached in Nigeria when it is possible to formulate, and put into effect successfully, policies for large areas of territory. The emphasis must remain for some time to come on more restricted schemes which will point the way to large scale developments. If these small scale schemes are to be successful in themselves, and at the same time lessons are to be learnt that will help in making larger-scale developments practicable, it is essential that basic information be collected in the initial stages. To think that an area is suitable for a certain type of agricultural development is insufficient; it is necessary to know all the relevant facts about it, and to work from them. Where possible, the sample surveys of the Department of Statistics might be carried out to confirm the suitability of certain areas for schemes of local agricultural development, and could thus be made to serve a dual purpose.

The second comment is on a vital need for coordination of effort. The work planned by the Department of Statistics should be integrated closely with land use survey now being carried out by the Soil Survey Section of the Department of Agriculture in the cocoa growing areas of Western Nigeria and with schemes for land use survey which are being planned for areas in the Northern Region (to determine their suitability for organized cattle rearing). The problems likely to be encountered in all these surveys are basically the same: coordination of effort and the pooling of experience will avoid unnecessary waste of time and public money and will yield quicker and better results.

Addendum (January 1955)

Since the foregoing paper was written the Department of Statistics has published its first progress report on the steps being taken to advance the collection of agricultural statistics in Nigeria.[1]

It has been decided to commence work in the Northern Region, during the present year in Kano, Katsina and Sokoto provinces, in Bornu, Bauchi and Zaria in 1956 and in the remainder of the provinces in the north in 1957. To facilitate this, pilot surveys were completed in three villages in July and August 1954 and in four more villages at the end of the year. The latter surveys were also used for the further field training

[1] 'Agricultural Statistics. First Progress Report.' Department of Statistics, Lagos. November 1954.

of survey teams who had attended courses of instruction at the Northern Agricultural Research Station at Samaru, Zaria and at the Department of Statistics, Lagos. Eight teams, each of three enumerators, will be employed in the main survey.

The main survey will provide estimates of land use, acreage and production of principal farm crops and numbers of livestock. Each province will be divided into strata based on the principal farm crops grown in its different parts and the villages in each stratum will be grouped in sizes, in accordance with the number of males in the 15–49 years age-group shown in the 1952 Population Census. From each stratum a 5 per cent. sample of villages will be selected for survey, giving a total of 102 villages to be surveyed in three years. Each village will be visited three times: from April–June for the livestock count and to complete a traverse survey of the village paths, presumably as a framework for a map; from July–October for the measurement of crop areas; and from October–February for estimating crop yields. The new plans allow for a much more detailed approach; particularly as regards the division of each province into strata and in the time spent at each village when the information to be collected at each stage will accord with the sequence of farming operations. These refinements together with the provision of trained survey teams must contribute very significantly to the greater accuracy of the information that will be collected. No reference is made to the amount of supervision that will be given to these teams and there is no doubt that this is a factor of outstanding importance. In the view of the writer it is to be regretted that there is no mention of any use to be made of aerial photographs and that there is to be no selection of sample villages on the basis of varying population densities.

ACKNOWLEDGMENT

The author wishes to express his thanks to R. W. Steel of the Department of Geography at Oxford, who provided both encouragement and practical help in the preparation of this paper.

FROM THE *JOURNAL* A HUNDRED YEARS AGO

THE FOLLOWING EXTRACT is taken from the Report of the Council and the Presentation of the Royal Awards at the Anniversary Meeting on 28 May 1855, and printed in the *Journal of the Royal Geographical Society*, Vol. 25, pp. viii and lxxvi.

"The Patron's Gold Medal has been awarded to Dr. Livingston for his recent explorations in Africa, between Lake Ngami and the Portuguese settlements on the West Coast . . .

"After the adoption of the Council Report the President rose to present the Awards, and Dr. Tidman having come forward, on the part of the London Missionary Society, to receive the Gold Medal for Dr. Livingston, Lord Ellesmere said:

"'After the observations which have been addressed to this Meeting, on the subject of Dr. Livingston's merits, by a Right Reverend Prelate, the Bishop of Oxford, a Fellow of this Society, it has become scarcely necessary for me to say anything in justification of an award, which I know will meet with an assent as unanimous in this assembly as it did in our Council-room. If its further vindication were necessary, I should appeal rather to the eye than the ear. I should point to the pregnant sketches of the routes of recent South African discoverers on our walls; and borrowing from the epitaph of Wren the simple word "Circumspice," request you to search for yourselves, where Dr. Livingston entered on the terra incognita of South Africa, and where, at Loanda, he emerged. The satisfaction with which I pronounce the award of our Society, unanimous as I am sure it is, is only alloyed by the circumstance that Dr. Livingston is not here in person to receive it, as he might have been, but for that noble spirit of perseverence and fidelity to his engagements with a native chief, which has launched him again on his adventurous career. It is some consolation to feel that, in his absence, I could not more appropriately confide this Medal than to the hands of Dr. Tidman, the distinguished Secretary of the London Missionary Society, which has found and sent forth an instrument for their sacred purposes, so illustrious as Dr. Livingston. Your character, Sir, and your functions remind me, that if Dr. Livingston has incidentally done that for science which has deserved from us, as a scientific Society, our highest reward, he has gone forth with even higher objects than those which we specially pursue. Your presence here reminds me that his object has been the introduction of Christian truth into benighted regions, and that the means and method of his action have been strictly appropriate to his ends.' "

" The Rev. Dr. Tidman replied:—' . . . When I had the pleasure on a former occasion of receiving, as Dr. Livingston's representative, the award of a chronometer watch from your Society, I ventured to express the sanguine expectation that, if his life were spared, he would hereafter accomplish more extended labours for the exploration of the interior of Southern Africa. That expectation was founded on the knowledge I have long possessed of the indefatigable industry and dauntless courage of Dr. Livingston; his ardent love of science; and above all his disinterested Christian benevolence toward the aboriginal tribes of that hitherto unexplored region; for I need not inform your Lordship and this Meeting, that, how anxious soever our Missionary traveller may be to ascertain the Geographical facts and physical features of the country, his first and ultimate object is with *the people*, by introducing them to a knowledge of that inspired volume which is the true source of civilization and happiness in the present life; no less than of immortal hope and joy beyond it. . . .' "

A NEW BRITISH ATLAS

THE TIMES ATLAS OF THE WORLD. Mid-century edition. Edited by John Bartholomew. Volume III. Northern Europe. *London: The Times Publishing Co.*, 1955. 19½×12½ *inches;* xii *pages; plates* 49–72; 57 *pages index.* £5 5*s*

FEW LARGE library atlases (formerly, for some obscure reason, referred to as "Hand atlases") are now published—for obvious reasons of production economics. The appearance of a British atlas in this class is therefore an event to be taken note of, for it will have few competitors. Indeed, it would be true to say that at the moment there is only one effective competitor, the Atlas of the Touring Club Italiano, and this is undergoing revision for a promised new edition. The Soviet Union has no doubt produced a comparable work, but since Soviet productions are not generally available, they can hardly be considered as rivals. Stieler's 'Handatlas' which might be regarded in some respects as a competitor, appears to have been a victim of the 1939 war. All this is not to imply that few atlases are being produced; it is perhaps symbolic of the times that these take the form of "national" atlases, *i.e.* atlases devoted to the geography, resources, and activities of a particular country: for instance, France is engaged on a new edition of the 'Atlas de France,' while, to mention two others only, Sweden and Belgium are issuing national atlases sheet by sheet. *The Times* Atlas is wider in scope and narrower in content—since it will eventually embrace the world, but is limited in general to topography only. The fact that there is an opening for an atlas which is international in approach is an important consideration to be borne in mind when discussing *The Times* Atlas. Before considering how it stands examination from this angle, an analysis of its content and cartographical style is necessary. Merely in regard to dimensions, this atlas is notable; it is in fact larger than the general atlases mentioned above.

This north-west Europe volume contains 24 plates, the scales of the maps ranging from 1/2·5M to 1/500,000. At the two extremes are Czechoslovakia and Poland (1/2·5M) and the Netherlands and Belgium (1/500,000). The general style of the maps is typical of Bartholomew, principally because of the adoption of layer colouring for the relief, though a number of refinements have been made. There is less than usual on the black plate, little more than the names and the railways. In addition to the sea and the rivers, the blue plate has the coast line, the graticule and its numbers, and the dotted contour lines. The reduction of black helps to lighten the plates. This has also been achieved, at a cost, by limiting the range of tints in the layer colours—green, buff, brown and grey. More contrast, especially between the two buffs, would give more character to the relief. The omission of yellow is certainly an improvement. As it is, the general effect on some plates is of two categories of country only, lowland (green) and highland (brown). Where considerable altitudes are included, however, the white, for snow cover, and the blue lines of the glaciers introduce more character. The lettering is legible, and, though there are a number of styles, not unduly fussy. The small names are in Times Roman. Except on one or two plates, the names are not too numerous; in fact, on the map of Ireland, for example, the trend is to the other extreme. The roads in red are conspicuous without dominating the other detail.

There is some variation in style from plate to plate. Those on which the city and towns are solid black are more effective than where they are hatched. The Netherlands and Belgium plates show the extent of wooded areas by rather poor tree symbols in blue, which spoil the effect of the map. The Iceland sheet, with a clear symbol in black for the lava fields, is one of the most attractive in this volume.

As regards the standard of accuracy, there are unlikely to be serious errors in the work of a cartographical firm with a century of experience behind it. In the main, a

fairly close study of one or two sheets shows minor slips or omissions only. On "South-west France," for instance, La Pallice, the out-port for La Rochelle, is shown without road or rail connections. The small river Nivelle has disappeared. There is a slip in the numbering of the road system; the main road from Bordeaux to the international frontier at Béhobie, Route Nationale 10, is mis-numbered N.132, and the latter shown as N.10. The omission of accents in two or three instances has also been noted.

One or two slips elsewhere, noted at random, should be corrected, *e.g.* "Zürich See" should be "Züricher See" (a long-standing error). On the Iceland sheet, the examples illustrating the pronunciation of soft "th" and harder "dh" have been interchanged. The Swedish lakes, Vänern and Vättern, are without the modified *a*. Place names within national boundaries have been given in the local official form. This raises few difficulties in this volume since, except for a small area of Russian territory, all are in the Roman alphabet. Whether, as there has yet been no peace treaty, the Polish forms of names in east German territory are, strictly speaking, "local official," is a nice point.

The editor has also put hydrographical names in the language of the adjacent country, so that in the Baltic there are at least four words for bay: *e.g.* Zatoka Pomorska, Hanöbukten, Mecklinburger Bucht. It might be argued that this is necessary in an atlas with an international appeal. But should one not then go the whole way and write Polska for Poland, Sverige for Sweden and so forth? The English reader might at least be helped by a short glossary on the back of each sheet: here also could be explained the abbreviations sometimes used. "Dovrefj." is not difficult to comprehend, but the meaning of "Espedals-v" is only revealed in the index.

The editor, John Bartholomew, has a considerable experience, personal and family, to draw upon, and it is of interest to consider how this has been applied in the production of this atlas. An opportunity to do so was afforded by a small exhibition at *The Times* Book Shop. From engraved copper plates of the earlier edition, transfers have been taken, which have formed the basis, when revised and corrected, of the plates required for the various colours. Many of the names have been set in type and "stuck down" for reproduction by photography. The final maps have been printed by deep etch photo-offset, and a high standard of colour printing has been attained, with sharp outlines and excellent registration.

There is a full index, containing over 40,000 entries, with the latitude and longitude for each, in addition to the map reference. Changes in names are covered by cross-references.

It is an interesting exercise to discover exactly how much information about a particular place can be extracted from a good reference atlas such as this. Position on the globe affords a general idea of its climate, and not only climatic conclusions can be drawn from its situation—whether coastal or continental. The representation of relief, though admittedly generalized, allows a general idea of its setting and surroundings to be formed, and, on the larger scales, even something of the physical history of the region. From the information conveyed about communications, the degree of accessibility and its general relation to the great centres of world activities can be estimated. Its size and importance are also conveyed either by the representation in some detail of its plan, or for a smaller settlement, by the size of lettering used. Finally, its political allegiance is shown, and the administrative division in which it lies.

To sum up: this mid-century edition, though the general design is on the conservative side, is attractively produced and gives a good coverage, while its treatment of names is international in approach. On the other hand, a more rigorous final revision of the plates should have been undertaken. G. R. CRONE

THE SOILS OF BRITAIN

MEMOIRS OF THE SOIL SURVEY OF GREAT BRITAIN. The Soils of the Wem District of Shropshire (Sheet 138). By E. CROMPTON and D. H. OSMOND. *London:* H.M. Stationery Office, 1954. *Memoir* 9½×6 *inches;* 79 *pages; plates. Map* 12×18 *inches.* 10*s* 6*d*

THIS MEMOIR and its accompanying map is the first of a series which it is hoped and intended will be continued to describe the soils of the whole country. Its publication is not only an important landmark in the history of soil survey in Britain, but is of high interest to the whole fraternity of field scientists, not least the geographers.

The Soil Survey of England and Wales was first formally recognized in 1939 under the directorship of the late Professor G. W. Robinson. The headquarters was transferred to Rothamsted under Dr. Alex Muir in 1946. In his first report to the Soil Survey Research Board (under the Agricultural Research Council) Professor Robinson outlined the history of systematic soil survey in this country. He referred first to Hall and Russell's famous study of the soils and agriculture of Kent, Surrey and Sussex [1] (1911). In this work, carried out in a region of simple geological structure, largely free from drift-deposits, the basis of the work was frankly geological, the assumption in Robinson's words being that each geological formation gave rise to its own type of soil. In fact the same formation or "parent material" can give rise to significantly different soils as the "site" and conditions of development vary. Nor was there any actual soil-mapping in these early surveys. The map of surface geology was already in existence and all that appeared to be necessary was to translate it into soil terms. Robinson also paid tribute to the later influence of visits by American soil surveyors J. C. Veatch (1924) and Dr. Linwood Lee (1929). The methods since followed here have been virtually identical with those used in America. The essential concept on which the whole method is based is that the unit or soil individual is the soil profile, *i.e.* the succession of horizons (or layers) seen in vertical section from the surface down to and including the upper part of the parent material. Soils showing the same general profile characters and developed from the same or similar parent material form a soil series.

In order to trace the development of the method and its consequence we may note that while Hall and Russell were content with a general description of the soils developed on the Hythe Beds, together with mechanical and chemical analyses of soil and subsoil for some eighteen samples, Bane and Gethin Jones dealing with the fruit-growing areas on the Lower Greensand [2] in Kent recognized no fewer than thirteen distinct soil series on the Hythe Beds alone. Similarly on the Wem sheet now before us, twenty-five soil series are distinguished. The memoir includes a foreword by W. Morley Davies, under whose direction, from Harper Adams College, the earlier stages of the survey work was carried out. The Introduction briefly describes the physical features, climate and geology of the area, though it must be deemed anomalous, and in fact regrettable, that no reference is given to the corresponding memoir of the Geological Survey. The greater part of the text is taken up with description of the soil series. This is followed by a short account of the agriculture and an important appendix on analytical data. The soil map itself is included folded in a back pocket.

The warmest welcome will be given to this publication by all geographers interested in the detailed study of their own country and a tribute is due to the large amount of laborious and careful work which is represented both by the map and the bulletin.

[1] 'A Report on the Agriculture and Soils of Kent, Surrey and Sussex,' Board of Agriculture and Fisheries, 1911.

[2] *Bull. Minist. Agric., Lond.* No. 80 (1934).

Both, however, do prompt doubts and questions. There is no ground for doubting that the Survey is following essentially sound methods, but the multiplication of soil series beyond a point bids fair to become unwieldy and too little susceptible to generalization. We may perhaps be permitted to express the view that the divorce of pedology from its geological basis has gone or is going too far; the fact remains that for most of the country all we at present have or are likely to have for many years to come are geological maps. It is both necessary and possible to use these as effective guides to soil conditions. If we may take as an instance country with which we are both familiar, we venture to doubt whether soil seriation will get far beyond the lines laid down by Hall and Russell in the Weald. If there are thirteen soil series on the Hythe Beds between the Medway and the Kent coast, how many more will be needed to cover also the Surrey, Hampshire and Sussex outcrops? What is obviously required, but is so far to seek, is an agreed method of grouping series into larger groups. This, as all British soil surveyors know to their cost, is a vexed question, if only because the Scottish Soil Survey does not use individual series names, preferring to deal in terms of "associations" in the sense in which the idea was developed by Professor J. H. Ellis of Manitoba in 1928. An association is a group of soils derived from the same or similar parent material but differing from one another in "site" or topographical position, and notably in their internal drainage. This method would be very difficult and perhaps impossible to apply in such an area as that around Wem, since a great part of the parent materials are exceedingly variable drift deposits. Thus "boulder clay" in the area may be of Triassic or Palaeozoic provenance with very different properties in the two cases.

It is fair to acknowledge that the soil series are in fact grouped in terms of the "major soil groups;" i. Brown Earths; ii. Podzolized Soils; iii. Gley Soils; and iv. Organic Soils. This is helpful, as is the system of colours adopted, brown tints for i, red for ii, blue for iii and purple for iv. The grouping enables the construction of a generalized map of the area showing major soil groups (p. 56) from a geographical standpoint; this is perhaps the most significant illustration in the volume. Nevertheless it would have been very helpful if the series had also been grouped in accordance with their parent material. This can only be learned by extracting the information (without benefit of index) from the text. The only case in which the Wem soil map and the geological map literally concur is in the case of "Alluvium" which is treated as a separate ungrouped soil series: it is curious that no description or comment upon this series appears in the text.

It would not be fitting or indeed fair to pursue here, at length, the very disputable topic of the grouping of soil series. It must suffice to say that as successive soil-survey sheets appear, geologists and geographers will show a close and probably increasing interest in the measure of correlation between soil and geological maps. Is the distribution of soil series going to appear completely haphazard? What appears to be lost sight of by the extreme apostles of seriation is that rock patterns, even drift patterns, are coherent, explicable and in a sense predictable as a whole, and if pedology is to claim rank as a science in any full and philosophical sense it must not lose sight of this manifest fact. In so far as outcrop areas are not soil regions, that, as we all realize, is due to variations of site, *i.e.* to the incoming of geomorphology. It has been said that the prime qualification of a geological surveyor is a knowledge or sense of geomorphology: it is certainly no less that of the soil surveyor and this provides still another reason, if such were needed, against the view of those geographers who seek to ignore geomorphology or assign to it a quite subordinate role in training.

S. W. WOOLDRIDGE and H. C. K. HENDERSON

REVIEWS

EUROPE

L'EUROPE CENTRALE. By PIERRE GEORGE and JEAN TRICART. *Paris: Presses Universitaires de France*, 1954. $9^{1}/_{4} \times 7^{3}/_{8}$ *inches; 753 pages; maps, diagrams and photographs.* Tome I, GÉOGRAPHIE PHYSIQUE ET HUMAINE, 1,200 *francs.* Tome II, LES ÉTATS, 1,800 *francs*

Twenty-four years ago, Armand Colin published de Martonne's 'Europe Centrale' as Tome IV of 'Géographie Universelle.' This outstanding work rapidly achieved the recognition which it deserved; indeed, it soon became a standard work of reference, and many geographers, mature and otherwise, owe a great debt to its eminent author. Although many of de Martonne's comprehensive generalizations remain valid, widespread changes have taken place since his book first became available; not only have there been large additions to the geographical literature on Central Europe but also the politico-economic patterns of this debatable area have been greatly modified. In other words, the time is ripe for the appearance of another full-length study of Central Europe and it is probably the finest tribute to de Martonne's scholarship and skill that any such work must stand or fall by comparison with his own study. 'L'Europe Centrale' of George and Tricart survives this test in part only. The authors have accepted, without question or modification, the master's definition of Central Europe but their treatment of its geography is markedly different.

The contents pages of de Martonne's two volumes remind us that he was pre-eminently concerned with the regional geography of Central Europe. His analysis of its physical background, including its biogeography, was covered in 96 of his total of 826 pages whereas this aspect of the geography of Central Europe occupies 205 pages of the 739 of George and Tricart. Furthermore, the whole of their Part III, "Les économies nationales d'organisation capitaliste" (224 pages) is devoid of regional, as distinct from national, treatment. Only in Chapters 2 and 3 of Part IV, dealing with Poland and Czechoslovakia respectively, do regional accounts appear. These details are recorded as evidence that 'L'Europe Centrale' is not a regional geography in the accepted sense, *i.e.* in the sense that areas are treated as wholes, including their physical and human aspects. While it is true that much of Professor Tricart's contribution to Part I is devoted to geomorphological regions, particularly in Chapter 2 ("L'Europe centrale hercynienne") and in Chapters 4 and 5 ("Les régions alpines et carpatiques"), there is scarcely a reference to those complementary human activities without which full regional assessment is impossible. It may be that the present authors, recognizing the excellence of de Martonne's handling of regions, regarded his analyses as definitive, yet the economic, political and social changes which they discuss must surely preclude such a view. Clearly, 'L'Europe Centrale' is not a rehash of 'Europe Centrale,' nor is it 'Europe Centrale' brought up to date. It has an originality of its own and brings to the reader a wealth of information that is not readily available in such a form elsewhere. The frame of the picture is familiar; the contents are new. If, by any chance, there exists a geographer who is not aware of the changes imposed on Central Europe by the second world war and its aftermath, this book will enlighten him.

A further general point may be mentioned at this stage. 'L'Europe Centrale' is one of a series of works published by Presses Universitaires de France under the title of "Orbis" and edited by Professor Cholley. The series is described in the publishers' list as "Introduction aux Études de Géographie." This description may be misleading in using the word "Introduction" as these two volumes are hardly introductory in the English sense. They are at least comparable in standard of presentation and content with, for example, Messrs. Methuen's 'Advanced Geographies.' In spite of

their reasonable cost, which may be partly explained by their poor binding and paper backs, £3 is unlikely to be an attractive price to the English reader who seeks an "Introduction."

This latest study of Central Europe is divided into two volumes each of which is subdivided into two parts. Part I (Vol. 1) (pp. 7–229), entitled "Le cadre physique," is written by M. Tricart, Professeur à la Faculté des Lettres et à l'Institut d'Études Politiques de l'Université de Strasbourg, except Chapter 7, "Les régimes hydrographiques" which is the work of Professor George. In his introductory remarks, Professor Tricart rightly insists that "L'élément essentiel du cadre physique est donc le relief. C'est lui qui fournit les principaux éléments de l'architecture géographique de l'Europe Centrale" (p. 2). Logically, he then proceeds from "Les grandes étapes de la morphogenèse" (Chapter 1) to analyses of the major physiographic regions, "L'Europe centrale hercynienne," "La plaine germano-polonaise" and "Les régions alpines et carpatiques." Each of these five chapters provides excellent material for the geographer not only in its clearly expressed factual content which is largely based on recent researches but also because of the objectivity of the author. This latter point is well illustrated in his handling of the controversy between the "ultra-nappiste" and "autochtoniste" schools of thought concerning the structure of the Alps. "Le problème de la genèse des Alpes est encore du domaine des théories" (p. 103), he concludes.

The last three chapters of this first part, "Les données climatiques: la semi-continentalité," "Les régimes hydrographiques," and "Les sols et la vegetation" serve to round off the physical geography of Central Europe in an admirable manner. Professor Tricart declares that Central Europe is ". . . une région de transition, riche en nuances" (p. 169); it is a "carrefour climatique." In such conditions, three main climatic types are discernible, those of the Germano–Polish plain, of the basins, and of the mountains, but this regional differentiation hardly agrees with his Figure 25, "Régions climatiques de l'Europe centrale," which is based on annual temperature ranges and duration of snow cover. Equally transitional in character are the biogeographical and pedological conditions of Central Europe. "One seeks in vain for an animal or plant species which may be considered as characteristic of this territory" (p. 205), yet the relationships between "l'homme and le milieu phyto-pédologique" have been, and remain, of vital importance in Central Europe. Well may one sympathize with the author's bibliographical note to Chapter 8. "On manque d'un ouvrage de synthèse sur ces questions et la documentation, bien qu'abondante, est très dispersée" (p. 229).

Part I of Vol. 1 provides an excellent account of the physical background of Central Europe, well up to the high standards of French geographers and very well documented. Where there are two sides to a case, both are given; where conclusive evidence is not available, the lack is admitted. The present writer expresses his opinion, with some regret, that it is unfortunate that there are indications of less detachment, less objectivity, in the remainder of this book. As Professor George rightly stresses, the key to an appreciation of the economic and political geography of Central Europe lies in the great differences between its industrialized, urbanized western part (Western Germany, Austria, Switzerland and the Czech lands) and its agrarian, rural eastern part which in current English usage is described as the satellite States. Furthermore, there can be no denial of the fact that revolutionary changes have taken place in Eastern Germany, Poland, Czechoslovakia, Hungary and Romania. Yet such statements as the following are at least open to question. "Rien n'est changé à la structure de l'Allemagne; seule sa position internationale s'est trouvée modifiée par son incorporation à un système économique dirigée par les États-Unis" (p. 291) and "Les mouvements de libération populaire ont bénéficié de la neutralité bienveillante des armées soviétiques qui, sans intervenir dans l'histoire politique de ces pays, ont aidé les peuples à réaliser leur révolution" (p. 292). Even assuming that this second statement was written before the riots took place in

East Berlin and other parts of the People's Democratic Republic during the summer of 1954, few western readers will agree that the Red Army played a role of "benevolent neutrality" in the recent development of the satellites, while to describe the objectives of the Yugoslavs since 1948 as ". . . le rétablissement de l'ancien système de relations entre l'État balkanique et les économies occidentales, c'est-à-dire la restauration d'un dispositif de type colonial, couverte par l'affirmation de thèses nationalistes" (p. 292) is demonstrably absurd.

Statements such as those quoted above, and they are not isolated examples, raise doubts in the minds of readers and, at the very least, suggest that the chapters of Parts II, III and IV should be read with caution. Part III is entitled "Les Économies Nationales d'Organisation Capitaliste" and contains chapters on "L'Économie Allemand," "L'Économie des Régions Alpines," "La Suisse" and "L'Autriche." Much of their contents belongs to the field of economics rather than geography and therefore lends itself the more readily to speculation, particularly in view of the inadequacy of reliable statistical data concerning those parts of Central Europe which remain under Soviet domination. Professor Tricart, who contributes Part III, is aware of this deficiency. At the end of his long chapter on "L'Économie Allemand" he states "Les publications [on the Democratic Republic] sont beaucoup plus fragmentaires et moins nombreuses que celles qui concernent la B.R.D." (p. 413).

With these reservations in mind, Parts III and IV of Vol. II constitute a useful contribution to the geography of Central Europe. The dichotomy which has been imposed on the area by the erection of the Iron Curtain is exemplified by the authors' contributions to this volume (Professor George has written Part IV "Les Républiques Populaires de l'Europe Centrale"). Of approximately equal length, these two parts reveal a striking difference in approach, a difference which springs from the contrasts in political and economic organization. Professor George undoubtedly had the more difficult task of dealing with the People's Republics. Much of his material is necessarily derived from the published plans of these countries and he is confronted with the problem which all students of eastern Central Europe meet—the rapidity of change. His chapters were written before the introduction of the "June Road" in Hungary, and before the abandonment of the Black Sea–Danube Canal, of which he says ". . . le grand œuvre de la période est la construction du canal de liaison entre le Danube et la mer Noire" (p. 733). Similarly his appreciation of the formation of "mixed companies" for Soviet-satellite joint development of Romanian and Hungarian resources is hardly justified by the recent demise of "Sovrom" and "Sovmag."

In spite of these adverse criticisms, 'L'Europe Centrale' is an important work. As the bibliographical notes indicate, the authors have used many sources although the publications of the Economic Commission for Europe seem to have been overlooked. Their maps reveal a wide range in accuracy and usefulness as a comparison of the population maps of Western Germany (Figs. 38, 39a and 39b) and of Poland (Fig. 53), Czechoslovakia (Fig. 64) and Romania (Fig. 74) shows, but many of them are new and they are generally well drawn and reproduced. Their "Index des Noms de Lieux" (pp. 739–46) gives the new renderings of many place names in the satellite States and is a valuable feature of the book. English readers will probably find that the small type used in long sections of the text is very trying to the eyes, but this is probably the publisher's device to keep the cost of the work down to a reasonable price.

A. E. M.

LES PLAINES DE CRAIE. By P. PINCHEMEL. *Paris: Armand Colin*, 1954. 10×6½ *inches; 502 pages; maps, illustrations and diagrams*

Philippe Pinchemel has at last tackled a task which geomorphologists have long felt required attention. In his 'Les plaines de craie' he has, in his own words, attempted to write an "explanatory description" of the physical features of the whole of Wessex, the Weald, and the chalk country of northern France, north and east of the rivers

Oise and Seine. Clearly he had taken great pains and the book is the fruit of an immense amount of work, for the long descriptive passages are full of detail, and he has not hesitated to examine critically a number of fundamental morphological concepts. Yet at the end the reviewer is left with an uneasy feeling that in some respects his conclusions are too broad and simple.

The main body of the work is divided into three "books." The first deals with "Exhumed fossil surfaces and morphologies, and their deformations." It is not easy to read, for the author has written more as a geologist than do most English geomorphologists, and the terminology is no help to the average English reader. How many realize, for instance, that the London Clay was deposited during the Ypresian transgression? In many respects his conclusions are at variance with those of earlier writers. He disagrees with Wooldridge and Linton, and with Briquet on the extent of the pliocene surface, preferring to think of most of the chalk outcrop as a little altered, exhumed infra-tertiary surface, and basing this conclusion on the stratigraphical relationships between clay with flints and eocene deposits. Nor does he accept the interpretation of the pliocene shoreline by Wooldridge and Linton on the grounds that it relies too heavily on the evidence of morphological features and not sufficiently on deposits of pliocene sands and gravels. He thinks that post-Pliocene earth movements have been sufficient to invalidate this thesis.

Book II is mainly descriptive, dealing successively with the topographical expression of the geology and of the structure, then with the "boutonnières" (perhaps best translated as "inverted relief forms" though this is neither a full nor an entirely accurate translation), arranged in roughly ascending order of magnitude from the depressions of Saint Maur and East and West Meon to the Weald and Boulonnais. It is completed by the statement of certain conclusions, the most important of which are that anticlinal depressions grow by the coalescence of the inversions of relief produced in the valleys of adjacent rivers, and that it is possible to distinguish between single cycle and double cycle inversions, the latter owing their origin to a combination of pre- and post-Pliocene erosion.

The third section of the work is devoted to a study of the drainage. Pinchemel takes up a position quite different from that of some authorities on its origin. He contends that at the end of the Pliocene period those parts which had not been submerged by the Pliocene sea had been reduced to a peneplain and covered with a mantle of alluvium. This surface was raised into broad anticlines during the earth movements which followed, and the main lines of the present drainage are consequent on this initial surface. After stating this, he proceeds to a detailed examination of the characteristics of chalk weathering, and the origins of dry valleys. Some theoretical hydrographical considerations follow, and then a description and interpretation of the evolution of each of the river basins.

A final chapter describes the Quaternary deposits and the effects of periglacial conditions during the Ice Age. In it the term "limon" is used in its broadest possible sense—to signify all fine-grained superficial deposits. In the same way "clay with flints" is used in a very extended sense on an earlier page. The latter is surely difficult to justify, for although in the past much plateau gravel and other material has been mapped as clay with flints, most geomorphologists would agree that the remedy is to correct the errors as opportunity arises, rather than extend the use of a very apt term until its meaning is lost.

It is a great pity that sketch-maps are not more freely used. There are plenty of diagrams of geological sections, and with a little rearrangement the same space (and blocks) could have been made to carry useful maps in addition. A minor irritation is that some English place names are sometimes gallicized, but not consistently so; and there are also far too many typographical errors, usually spelling mistakes. Yet this is a most stimulating and provocative work and should certainly be read by all who take a serious interest in the physical geography of the area. A. M. F.

ASIA

SA'UDI ARABIA. By H. St. J. Philby. *London: Ernest Benn*, 1955. 8½×5½ *inches;* xix+393 *pages; map and illustrations.* 30*s*

'Arabian Jubilee' was interesting enough, so readers of Mr. Philby's present volume will not blame him for the stodginess of its first two-thirds. The story of the rise to power of the Ibn Sa'ud dynasty under the fluctuating influence of the teachings of Muhammad ibn Abdul Wahhab is buried in a mass of detail which discourages still further a reader already intimidated by the Muslim names which repeat themselves in a few combinations with bewildering frequency. The index, a model of scholarship, contains nearly eighty entries under Sa'ud and nearly seventy under Abdullah. This must be a deterrent to the layman who is not even told (unless this point also is buried in detail) that the *Ibn Sa'ud* that concludes the name of each ruler has the special meaning of descendant of Ibn Sa'ud. The last third of the book, about the reign of the great Ibn Sa'ud who died in 1953, is full of interest, as is the foreword on the situation since his death; but we could wish that more attention could have been paid to some of the following points.

Ibn Sa'ud may have been justified in refusing to recognize the Capitulations, but has the Shar' law been found adequate for the solution of legal questions arising out of the oil concession, and, above all, for the trial of criminal charges against foreigners? Would a Sa'udi judge, on evidence which the Shar' law considers adequate, order the hand of an American engineer accused of theft to be struck off? Then Mr. Philby's treatment of the Anglo-Turkish negotiations about frontiers, in 1914, is inadequate. They were part of an attempt by the British Government to settle with Turkey all outstanding causes of dispute; and the agreement about frontiers in Arabia should be judged in the light of the time, when the break-up of the Ottoman empire could not be foreseen, and when the death of Ibn Sa'ud in an affray or the appearance in Turkey of a ruler such as Ataturk might have led to the disintegration of the infant Sa'udi realm.

A point on which Mr. Philby's views would have been invaluable is the possibility of development in the present Sa'udi régime. He rightly approves the eviction of corrupt, often foreign, elements from the administration, and the setting up of a cabinet in charge of reorganized departments; but in calling this "responsible" government he uses the word in a limited sense; and he says nothing about the possible influence of ideas from adjacent countries, where experiments in democracy are being made with varying success. Some consideration of the tenets of "Wahhabi" puritanism would also have been welcome. One learns incidentally that the penalty for adultery is (or was) stoning, and that the use of alcohol, tobacco and music is in principle forbidden, though the two latter are now tolerated; but it is not mentioned, still less made the subject of comment, that the régime which forbids the use of silk and the precious metals and in general prescribes austerity, recognizes the Quranic provisions on the subject of polygamy and concubinage, or, as one might say, *défend le luxe et permet le luxure*. The *luxure* is bound up with slavery, as to which Mr. Philby merely says (page 303) that "the British Government clung tenaciously to its old right of manumitting runaway slaves who might take sanctuary in its Consulate." The point was that Ibn Sa'ud, like King Hussein before him, did not recognize the abolition of slavery by the Turkish Constitution of 1908 as affecting slaves in the Hijaz, and that in consequence the British Government reverted to its right to secure the manumission of a fugitive slave which existed in the Ottoman Empire before 1908. Would it have been better for Arabia, and above all for slave women who can now be sold or given away as chattels, if slavery had ceased to exist in the Hijaz and even in Najd? Perhaps not, but it ought to be considered. It may be that Mr. Philby, living in Riyadh, is too near these questions to discuss them dispassionately. It is pleasant to end with praise for the map, on which so many areas would still be blank but for the indomitable travels of Mr. Philby himself. R. W. B.

THE ONE REMAINS: A report from Jerusalem. By STEWART PEROWNE. *London: Hodder & Stoughton*, 1954. 9×6 *inches;* 192 *pages; maps and photographs.* 20s

The title of this book is a quotation from Shelley's Adonais; the sub-title explains its object. Its author after extensive service in Palestine, retired to stay in Jerusalem and assist the Anglican Bishop to built new villages for the refugees. His book falls into three parts, a description of Jerusalem, an account of the present state of its inhabitants and a moving story of what is being done to relieve and restore the unfortunate refugees in Jordan.

It must be difficult for anyone who has played a part in its former administration to write without bitterness of a city now suffering the torments of being sawn asunder. But the author knows and understands Jerusalem as the Eternal City which has experienced humiliations and destructions before and has changed hands no less than twenty-five times during more than three millennia.

The present is a sad picture but one not without hope. There is a graphic and moving account of the refugees, many of whom exist miserably in caves, vainly hoping to return to the lands beyond the barbed wire from which they were driven. But this is followed by a simple account of the work, in which the author is playing a leading part, of encouraging the refugees to build their own new homes, with all the communal requirements of village life, so that refugees are transformed into citizens.

The book is a finely written expression of thoughts and faith. It is illustrated with helpful maps as end-papers and many beautiful photographs. E. C. W.

TING HSIEN: A North China rural community. By SIDNEY D. GAMBLE. *New York: Institute of Pacific Relations*, 1954. $9^{1}/_{4}\times6^{1}/_{4}$ *inches;* xxiii+472 *pages; sketch-map, diagrams and illustrations.* $6.50

According to the foreword, written by Mr. Y. C. James Yen, founder of the Chinese Mass Education Movement, the social survey recorded in this volume has contributed more than any other single factor to a scientific approach to the social and economic problems of the Chinese peasant. This pioneer attempt to carry out a modern social survey of a Chinese rural community was made between 1926 and 1933 in Ting Hsien, a 'county' of Hopei province in northern China, but although three volumes of findings have previously been published in Chinese the present book is the first to record and summarize the data in English.

The detailed statistical information it contains, particularly in the sections on Family Studies and Agriculture, is a useful supplement to the more generalized studies of such scholars as Buck and Chang, whose findings, for the most part, it substantially confirms. Although rather severely dehydrated, the section dealing with Social and Religious Activities also contains much of interest, but the final chapter on Geography is far from adequate and lacks even an orientation map.

Clearly, in view of the revolutionary changes that have taken place in China since the survey was made, its findings are now in many vital respects outdated. Nevertheless they do provide a reliable record of the recent past and if ever detailed studies of similar areas under the new régime become available it will be possible to make much more valuable comparisons than if this survey had never been made.

C. A. F.

NANGA PARBAT. By KARL M. HERRLIGKOFFER. *London: Elek*, 1954. $9^{1}/_{2}\times5^{1}/_{2}$ *inches;* 254 *pages; maps and illustrations.* 21s

This is a mountaineering epic of unusual interest, of attempts—several ill-fated—to scale what was, until 1954, the second highest summit ever ascended by man.

In Book One, "Tragedies," the period covered is from 1895, the year of Mummery's rash venture, down to the fatal "Winter Escapade" of 1950. It has been ably and impartially dealt with by Mrs. Eleanor Brockett and Anton Ehrenzweig (translators of the German version of the book) and concludes with a summing up by Erwin Schneider, Nanga Parbat veteran of 1932.

Book Two, "Triumph," is Dr. Herrligkoffer's official report of the Willy Merkl Memorial Expedition of 1953. He writes dramatically of the alternating progress and frustrations and of the ultimate attainment of the objective striven for so long and at such great cost of life. Aschenbrenner of Kufstein, also a Nanga Parbat veteran of 1932 and 1934, continues the story describing the build-up to Camp IV, close under the Rakhiot Peak at 22,000. Another Austrian, Frauenberger, after shepherding the Hunza porters up the Rakhiot ice-wall, tried to establish Camp V at 23,000 but was forced down to a site at 22,600. The oxygen had to be left at Camp IV.

On June 30 word came through from Base Camp to those on the mountain that the monsoon had come and that the high camps were to be evacuated forthwith. However, the weather had cleared above, and it was decided to face the great risks involved and launch the assault. The fullest credit has rightly been given to Hermann Buhl of Innsbruck, who, unaccompanied, climbed over 4000 feet in seventeen hours and with almost superhuman determination and power of endurance, reached the summit a few minutes before the sun set. Without oxygen, without food or drink, inadequately clad, without sleeping bag or shelter, he spent seven hours of darkness at over 26,000 feet. At early dawn, both feet frostbitten, he resumed the arduous descent, limping down to the Diamir depression, up again to the Silver Saddle, and finally, twenty-eight hours after starting up, staggering into the arms of his comrades close to the Moor's Head. But for the unexpectedly long spell of fair weather which mercifully lasted till Base Camp was reached, the Naked Goddess must again have taken toll in lives of men.

No Sherpas took part in the ascent; the Himalayan Club had enrolled, routed and despatched a team but arrangements made for the onward journey broke down. The Hunzas seem to have done well. Herrligkoffer, while deploring the non-arrival of the Sherpas, expressed the opinion that "the conquest of Nanga Parbat with Hunza porters was just within the limits of possibility" which proved to be the case. The author has acknowledged the generous cooperation given to his expedition throughout Pakistan by officials and others. An Appendix, "The Hunza Porter," by Eleanor Brockett and Anton Ehrenzweig, in which the Hunzas and their neighbours the Nagirs are well and fairly described, is a valuable addition to this very interesting and well produced book. It is well provided with illustrations, some in colour, and has adequate sketch-maps. H. W. T.

SOUTH COL. By WILFRID NOYCE. *London: Heinemann*, 1954. $8\frac{1}{2} \times 5\frac{1}{2}$ *inches;* 303 *pages; plates, line drawings and maps.* 21*s*

To quote the author: "There are many books about Mount Everest; some might say too many." This one, unlike most narratives of Himalayan travel, gives the "inside story" of the daily lives of men at high altitudes, of their doings, of their talk and of their reactions to what they see and do. Wilfrid Noyce has recorded his own thoughts as they came to him from day to day. He takes you from the invitation while he was actually teaching at Charterhouse to the first gathering of the team at the Royal Geographical Society, with John Hunt leading the initial discussion on organisation, food, equipment and other countless requirements, "all as business-like as any board meeting." Under "Dramatis Personae" each member of the expedition is introduced, in few words but true to life. Noyce's summing up of his chief's personality deserves reproduction here. "John fulfilled Gino Watkins' proposition that a leader should be able and prepared to do all that his team must do. He must never be on his dignity with them, nor be above mild ribaldry at his own expense. It is not too much to say that in an expedition of this nature admiration, and even love, of the leader is the largest single factor making for happiness, and this team was a more than happy one."

The book is superbly illustrated with photographs and with line drawings by A. J. Veilhan in collaboration with the author. The "end papers" consist of speaking likenesses, also by Veilhan, of seventeen members of the party, including Tom Stobart of cine-camera renown and James Morris, *The Times* correspondent. Wilfrid

Noyce has produced a first class, it may be said necessary, supplement to Sir John Hunt's excellent official history of the expedition. He has succeeded in what he set out to do by presenting vividly to the reader the scenes which he himself saw and in which he took part. H. W. T.

TIBETAN MARCHES. By ANDRÉ MIGOT. Translated from the French by Peter Fleming. *London: Rupert Hart Davies*, 1955. 8½×5½ *inches;* 288 *pages; maps and illustrations.* 18*s*

The author is a French doctor who had already led an adventurous life, including a journey by bicycle from France to India. When stationed in Indo-China he was charged by the École Française d'Extrême Orient in Hanoï with the task of carrying out research into various archaeological and other aspects of the Buddhist religion. Reaching Kunming (Yunnan Fu) by air he set out on his journey for the Sino-Tibetan marches. At one point between Ya-an (Ya-Chou) and Kangting (Tachien-Lu) he was robbed of everything he possessed. With great perseverance after this calamity, he managed to reach Kangting where he had some funds awaiting him, and with the help of the French Catholic missionaries he fitted himself out again, and continued to Kantze and Jyekundo. At the latter place he made an attempt in the disguise of a pilgrim to reach Lhasa, but after travelling some 200 miles was arrested and brought back. All this seems to have been done in a surprisingly friendly and pleasant manner. From Jyekundo he continued northwards; owing to the lawless state of the country it was necessary for him to join a large well-armed caravan. From Tangar he paid a hurried visit to Koko Nor. Owing to fog and mist the lake did not impress him favourably. He travelled on from Tangar to Sining and thence to Peking by cart and rail. After reaching Peking itself, one of his most interesting adventures unexpectedly took place. On a visit to the Ming tombs with one companion he had to cross over into Communist held territory where they were arrested. He compares lack of order and discipline among the Kuomintang with the order and enthusiasm in Communist held country. On his arrest he thought it was just another case of banditry and, knowing the form by now, was prepared to undress and hand over all he possessed. However, things were soon explained and he and his companion were taken twelve days' journey to the Communist headquarters, and he had an opportunity of seeing how the Chinese fared under Communism. The peasants were happier and more contented, which was only to be expected when the landlords had been dispossessed and the peasants had received their land free. Their chief complaint was the continual "indoctrination." They were forced to attend meetings, lectures and discussions which seemed to them a waste of time.

The description of "Tibet" is somewhat misleading. In this book "Tibet" refers to eastern Tibet only. In Lhasa and central Tibet conditions are (or were!) very different from the descriptions here given. Though not opening up any unknown ground it was a great and adventurous journey undertaken with praiseworthy persistence under difficulties and calamities which would have deterred many travellers. The story is well told and the translation excellent. For an English translation it might have been better if temperatures had been given in Fahrenheit, or if not, an indication that they are centigrade figures might have been given. There are two maps. One in the neighbourhood of Rongbatsa and Yulong is misleading. There is no index: a great loss to any book of travel. F. M. B.

AFRICA

LE SAHARA FRANÇAIS. L'Afrique Blanche Française. Tome II. By ROBERT CAPOT-REY. *Paris: Presses Universitaires de France*, 1953. 9×5½ *inches;* viii + 564 *pages; maps and photographs.* 2000 *francs*

LE HODNA (Algérie). By JEAN DESPOIS. *Paris: Presses Universitaires de France*, 1953. 10×6 *inches;* 409 *pages; maps and photographs.* 1500 *francs*

These two books are both by Professors of Geography in the University of Algiers,

and the second is dedicated to the author of the first. Professor Capot-Rey's book forms part of a series on the geography of the French Union and is the second of the two volumes covering 'Afrique blanche française' (the first, on North Africa, is by Professor Despois). It includes much that is as applicable to the non-French parts of the Sahara as to the French areas. By contrast, Professor Despois is concerned with only a relatively small part of Algeria, his study being one of several investigations undertaken by him in regions adjacent to the Sahara. But though the nature and size of the areas described are so different, the methods employed are similar and the attitude to regional geography shown by both authors is essentially the same. Both volumes are well illustrated by maps and diagrams, and by excellent photographs, and contain a wealth of bibliographical information.

The Sahara volume falls into three main parts. The first describes the desert environment, beginning (significantly) with climate and the evidence for climatic changes, followed by relief and structure. The second part is concerned with human geography—the people, their racial composition, the basis of their economy, the importance of nomadism and pastoralism, and the special conditions in the oases where the supply of water is all-important. Four geographical regions are distinguished—the northern, southern, central and Atlantic Sahara. The third part, on "l'œuvre française," gives an interesting picture of the "slow and difficult start" and of the means whereby the conquest of the desert is being achieved. There are full and up-to-date accounts of Saharan communications, mineral production and water resources; the latter are discussed at particular length, here as elsewhere in the volume, since they must be the basis of all agricultural progress and most other economic development. Figures for 1951 are quoted wherever possible, and they indicate marked advance in most fields of production. Professor Capot-Rey is not complacent, however, and is particularly worried by the disparity between population growth and the increase in agricultural output, and by the danger of famine. He also sees difficulties in the supply of power and of labour, and the supreme problem of the education of the settled peoples—"the renewal of the moral climate of the oases," as he puts it. But, given "a little science and a lot of patience," he has a deep faith in the future of the French Sahara.

Professor Despois' book, dealing in greater detail with a much smaller area, follows the same general lines of regional description: natural conditions, population, water supply, economy, settlement and types of life. The Hodna, like the Sahara, is a "marginal area;" climatic and hydrographic conditions are, as in the Sahara, of outstanding importance; as in the desert, the use and conservation of water must form the basis of the economy; and there are similar problems resulting from the increasing population and the general inadequacy of food production. There is too the same recognition of the reality of the French achievement. But there are also many significant differences in the two environments. Viewed together, these two volumes amply confirm the value of the French concept of regional geography, and the use of its methods at both large and small scales. They also serve as a reminder of the extent to which geographers are accepted in French Africa, as well as in France, as sound guides to the full appreciation and understanding of any area. R. W. S.

SOME RECORDS OF ETHIOPIA, 1593–1646: being extracts from 'The History of High Ethiopia or Abassia' by Manoel de Almeida, together with Bahrey's 'History of the Galla.' Translated and edited by C. F. BECKINGHAM and G. W. B. HUNTINGFORD. (Works issued by the Hakluyt Society, 2nd ser., no. CVII.) *London: The Hakluyt Society*, 1954. 9×5½ *inches;* xcvi+267 *pages; maps and illustrations*

This is a very useful volume of assorted contents. It is convenient to have even an incomplete English translation of Almeida, and one could wish that more basic Portuguese and other writings, such as Paez' History, for instance, and the 'Futuh' could also be translated. Perhaps the most valuable part of the book is Mr. Hunting-

ford's introduction of nearly one hundred pages which contains the only modern account in English of those little-known states, now predominantly Galla, in southern Ethiopia. These are probably the most inaccessible parts of Africa; but they were once, before the Galla invasions of the sixteenth century, sufficiently integrated with the Ethiopian polity to have an occasional Christian church, such as that in the Kaja region (p. iii), about which we should like to be told more. There is a useful gazetteer, but it was a pity not to incorporate in it the names on p. xcvii. In fact, judged merely as a piece of book-making, its composition is rather confused. There is a lot to be said for an orderly series of Appendices at the end of a book and a fairly full list of contents at the beginning. These are, however, minor points; it is gratifying to have at last something about Ethiopia from a non-philological angle. A special word of praise must be given to the maps which are excellent in every respect, even when judged by the high standard set by this *Journal*. O. G. S. C.

AFRICAN ADVENTURE

Two recent books give some account of French activity in the Sahara. WORLD WITHOUT MERCY (*Werner Laurie*, 1954, 15*s*) is a thrilling tale of the exploration and the conquest by the French of the Sahara. There is never a dull moment in this book; but in spite of the "Western" style, it is accurate enough and the illustrations very good indeed. The legend of an underground sea beneath the desert is repeated; a very poor metaphor, for the truth is, that the water-bearing lenses in the sandstones lie more like the streaks in bacon. The book ends with the dramatic meeting of General Leclerc's Free French with the Eighth Army at Garian. A very good book for the young in heart—Tartarin would have loved it.

TEFEDEST, the name of part of the Hoggar mountain range, has been adopted as the title of a witty and lively account, by Louis Carl and Joseph Petit (*Allen & Unwin*, 1954, 18*s*), of a trip to that region in 1949–50 by four young Frenchmen to copy rock paintings and drawings. After a thousand miles of motor travel they found themselves obliged to make use of the slow but photogenic camel. The illustrations of their travels are excellent; but, except for Plate 15, one has to take the beauty of Saharan rupestrian art for granted. The "explorers" were new to the desert, to the camel and the Tuareg, so their adventures make exciting reading and the translation is racy and good. With all else in the book, even the short Arabic glossary, some care has been taken; but there is no index. G. W. M.

AMERICA

BRITAIN AND THE UNITED STATES IN THE CARIBBEAN: A comparative study in methods of development. By MARY PROUDFOOT. *London: Faber and Faber*, 1954. $8\frac{1}{2} \times 5\frac{1}{2}$ *inches;* xxi+434 *pages; map.* 42*s*

Mrs. Proudfoot's study of the Caribbean is as valuable for the information that it provides about different British and American territories as for her comparison of the methods adopted for their economic and political development. To those not versed in the study of political institutions, the comparison may seem to be unnecessarily long and occasionally rather strained, but no one will deny the author's success in making an objective and balanced assessment of the general situation in the Caribbean. Mrs. Proudfoot has concentrated on the American territories of Puerto Rico and the Virgin Islands and on selected British islands—"three relatively prosperous islands" (Barbados, Jamaica and Trinidad), and St. Lucia, "probably the most backward of all the British possessions." These provide her with what Miss Margery Perham describes in a preface as "the most striking illustration of the Anglo-American relationship which combines close cooperation in parts of the colonial world with a wide divergence of views about colonial theory and practice." The study is particularly timely in view of current discussions of Caribbean Federation and of the awakened interest in the development of tropical areas throughout the world.

An introductory chapter provides an excellent general background for the whole study and might indeed have been expanded. Geographers will be disappointed to find that the wife of an American professor of geography at Northwestern University devotes only twenty-three lines to a section headed "the geography of the islands" which in fact does no more than refer to location in space. But elsewhere in the book they will find a wealth of material not conveniently accessible in other sources, especially in the chapters dealing with the composition of society, the economic life of the islands, and the population problems of the Caribbean. In addition Mrs. Proudfoot discusses the central and local government of the territories, their relationship with the British and American governments, and the structure of the politics of the islands.

Against this broad and varied background it is possible to assess the significance of the many problems of the Caribbean. The poverty of the whole economy is revealed in the shortcomings of the social life, and in the difficulties of educational development; and the general seriousness of the position is heavily underlined by the rapid growth of population and by its very uneven distribution. Mrs. Proudfoot attempts to look beyond the immediate problems to the prospects of the future—the chances of industrialization (where Puerto Rico provides some interesting illustrations, though they are not usually relevant to the situation in the British islands), the opportunities for emigration (perhaps to the mainland territories of Guiana and Honduras), and the desirability of federation. In the latter she believes that "the solution for the discontents of the British West Indies lies," though her chapter on the subject hardly substantiates this claim. All that she says, however, has obvious relevance to the political situation in the islands today. The conclusion that will win general approval is that it is "an inescapable fact that this area is undeveloped and backward primarily because it neither produces nor, as far as can be foreseen, will ever produce, anything of value that the rest of the world cannot obtain more cheaply elsewhere."

Such a fact is of the most serious consequence for a small, but interesting and important, part of the Commonwealth. West Indian problems call for earnest and continuous study, and there is urgent need for what the author calls "an exhaustive area study, the basic material for which is not yet available." Mrs. Proudfoot has performed a useful service in making available in a single volume so much factual information and such a valuable commentary on it. The comparison with American methods in adjacent territories further adds to the value of the book, especially as many of the differences in attitude extend far beyond the Caribbean to underdeveloped areas throughout the world. R. W. S.

AMERICAN REGIONAL GEOGRAPHY

NORTH AMERICA, by Miller and Parkins, is one of the best known and most useful textbooks of that continent. It has been extensively revised, with Mr. Hudgins as a third author (*Chapman & Hall*, 1954, 60*s*). The area treated includes Mexico and Central America, the latter so briefly that it might have been better omitted. The use of statistics has been greatly increased compared with previous editions, so much so that there is seldom sufficient space left adequately to define the terms used or to elucidate their significance. If a statistic is worth quoting, it is worth quoting precisely. Similarly some of the newly introduced maps obtained, like the statistics, from government sources, are badly presented in being too greatly reduced to be clearly legible. The harmless characteristic of the American of "boosting" his homeland is applied to each region of the U.S.A. in turn so that among the welter of superlatives it is sometimes difficult to discover the relative importance of the various areas. It is here that a more critical use of statistics could bring a clarification. This lack of balance of interpretation between different parts of the U.S.A. appears to be largely due to an attempt to revise a text originating in 1924. Economic and social changes since that date, especially in the South and on the Pacific coast, require a more complete rewriting of the human geography of the U.S.A.

In THE PACIFIC NORTHWEST (*Chapman & Hall*, 1954, 68*s*), thirty authorities have contributed to describe the geographical elements of the area in which most of them live and teach. This area, distinguished by a climatic and orographic pattern, is taken to include the states of Washington, Oregon and Idaho, the western, mountainous, portion of Montana and the Province of British Columbia, the latter being lightly treated, mostly with reference to its southern districts. Largely historical introductory chapters emphasize the small population and their frequently recent arrival, against which can be set the magnificent scale of the land they occupy and its extensive resources. A regional division is made largely on grounds of relief and structure, but without the illustration of a geological map. Most of the chapters, however, are systematic rather than regional studies and, each having a separate author, parallelisms between the chapters appear the more significant. The story of catastrophic decline in yields is repeated in accounts of salmon, halibut and oyster fisheries, natural grazing, wild game, soil and lumbering. Similarly it is possible to compare the varying success of the subsequent conservation measures, including some involving international cooperation. The second edition presents the post- rather than the pre-war position and the major alterations have therefore been made in the chapters on agriculture and on industry and commerce. The great wartime expansion of manufacturing in the North-west is surprisingly little discussed, perhaps because the phenomenal expansion has been followed by a rapid contraction due to fewer government contracts. For many communities, shipbuilding has been as short-lived a basis for prosperity as lumbering or mining. The exceptional value of this book lies in its scale, the area covered being large enough to permit of significant generalizations to be made and yet small enough for the facts on which they are based to be presented in detail. This is a useful corrective to the sketchy treatment this area must receive in the one volume text-books on the U.S.A. The numerous specialists who have contributed have ensured a high standard of accuracy and a variety of view-points. The relationship between the diverse subjects treated is not so well developed and this balanced assessment based on an informed understanding, which is the geographer's special contribution, is left to the reader. W. T. W. M.

PACIFIC

SOUTHWEST PACIFIC. By K. B. CUMBERLAND. *Christchurch, N.Z.: Whitcombe and Tombs*, 1954. $8\frac{1}{2} \times 5\frac{1}{2}$ *inches;* xviii+365 *pages; maps and illustrations.* 19*s* 6*d*

The rapid southward drive of Japanese forces in the Second World War aroused in Australians and New Zealanders alike a consciousness of each other and of their joint responsibility as custodians of democracy in the south-west Pacific. The present volume is designed to make available to them an objective geographical account of each other and of their island neighbours. Essentially 'Southwest Pacific' is a school text-book and, as such, it will supply a long-felt need of teachers of geography in the post-primary schools of the two States. It will also be welcomed by people in other parts of the world desiring to know something about the resources and problems of these two young countries, whose statesmen are taking an increasingly important part in regional and international councils.

The book is admirably illustrated by maps, diagrams and photographs. The author is fortunate indeed in having a publisher who has allowed him so many illustrations in a book costing the modest sum of nineteen and six pence. The book fulfils so well the purpose for which it is designed that minor points of criticism seem captious. Many of the photographs seem badly chosen as they depict scenes which one would have thought were familiar to the readers for whom the book is intended; many would seem to be of sociological rather than geographical interest. However, doubtless they illustrate the author's belief, expressed in his closing paragraph, that "conceived in simple terms" geography is "the study of what places are like." Geographers generally will find much to interest them in 'Southwest Pacific' which can be recommended

without reservation not only to students, but also to the general reader who wishes to bring up to date his knowledge of the territories described. E. M. J. C.

ADAM WITH ARROWS: Inside New Guinea. By COLIN SIMPSON. *London and Sydney: Angus and Robertson*, 1954. 9½×6½ *inches; 240 pages; maps and illustrations. 21s*

Many portions of the highlands of New Guinea remain to be explored. This is new country and the story of its gradual, and partial, penetration during the past twenty years furnishes one of the last chapters in the history of the Age of Exploration.

As in every previous case, the discovery of new lands has meant at the same time the discovery of new peoples. It was part of Colin Simpson's aim to describe these new men. But he found them so numerous and so variedly exotic that he has limited himself in the present volume to the eastern and western extremes of the highlands, leaving the people of the central highlands for a second book. The other part of his story almost inevitably involves the Australian officers whose job it is to bring the highlands "under control." The largest section of the book deals with the Kukukuku of New Guinea and Papua, the establishment of the patrol station at Menyamya and the subsequent relations between officialdom and these warrior cannibals. It is a brave, sad story, full of good will and misunderstanding. One may be moved by the haunting refrain of the villagers, shouting from the ridges above their homes, "Go away. Do not come here. Go away!"; or horrified by examples of the apparently senseless native blood-lust; or impressed by the humour and calm courage of the patrol leaders. They are all documented here. Some of the best material is that obtained personally or in conversations with the participants. This is true of the remainder of the book as well. There is a short section on the "probable" existence of pygmies near the Lamari River, the account of a patrol in the area of the Wigmen's Mountains, and finally some thirty-five pages on Telefolmin, an hour's flying west of Wabag, near the Dutch New Guinea border. The interlocking of fact and excitement is, on the whole, successful. And it is aided by the excellent reproduction of a number of photographs, ten of which are in colour. M. W. S.

MATHEMATICAL AND PHYSICAL GEOGRAPHY

MORPHOLOGIE LITTORALE ET SOUS-MARINE. By ANDRÉ GUILCHER. *Paris: Presses Universitaires de France*, 1954. 9½×7½ *inches; 216 pages; maps, illustrations and diagrams*

Professor Guilcher has written a straightforward and useful book on coastal morphology. In it he has included a short but adequate sketch of submarine morphology in general. The volume does not in any sense replace Douglas Johnson's classic work 'Shore processes and shoreline development,' which appeared in 1919, but it nevertheless represents a most useful summary, well supported by full references, of the main work accomplished since that time. Investigations on various aspects of coasts have been increasing recently, especially in north-western Europe and the United States. The practical problems associated with erosion and deposition, those connected with tidal surges, to say nothing of those concerned with the increasing popularity of the coast, have all helped to focus attention on the borderline between land and sea. Many recent studies have been concerned with particular countries, or with some characteristic stretch of coastline. There was room for a more general book —and Professor Guilcher has filled this gap.

His chapters deal with the forces at work on a coast; the vertical movements—especially those of recent geological times—which have produced the intricate problems of raised beaches and submerged forests; the details of coasts—cliffs and platforms, beaches, dunes, deltas, estuaries, marshes and also coral reefs; the classification of coasts; and littoral evolution. The last part of the book is concerned mainly

with the continental platform and slope, including submarine canyons, and with the general form of the ocean floor.

Such a wide variety of themes needs careful handling. It is all too easy to lose balance between them. But the author has handled his material with discretion, and in little more than two hundred pages has given fair and clear accounts of many subjects. This general work, however, is based on the author's own researches and detailed field work in France, Morocco and Madagascar. Moreover, there are many parts of our own coasts well known to Professor Guilcher. Inevitably, it is possible to pick out details here and there where explanation or discussion might be fuller. Some of the Norfolk salt marshes, for example those off Stiffkey, scarcely belong to any one of the three categories distinguished. But details of this sort can hardly be accommodated in a relatively short book.

The author has succeeded in being clear, readable and judicious, and the book is of real value to anyone interested in coasts. Professor Guilcher is a geographer, and writes primarily from that point of view, but geologists, engineers and others will find much to study and ponder. The diagrams and maps are to the point; it is a pity that several of them were not reproduced on a bigger scale. The plates are well chosen. Since the book deals with coastal morphology in general, it should be welcome in all countries. The comprehensive bibliographies are admirable. J. A. S.

GENERAL PRINCIPLES OF GEOLOGY. By J. F. KIRKALDY. *London: Hutchinson's Scientific and Technical Publications*, 1954. 9×6 *inches; 327 pages; illustrations and diagrams.* 25*s*

New discoveries are being made as rapidly in geology as in other sciences; it is therefore refreshing to find a book like this which does not set out primarily to give a detailed summary of new information and techniques, but is concerned to restate in the light of modern research the outlook and methods of approach of the geologist. Dr. Kirkaldy has succeeded in producing an extremely clear and well-argued introduction to the basic principles of geology; his book, moreover, is a model in the use of the deductive method which, as he says in his preface, "is the best method for attacking any geological problem."

Though the different aspects of geology are dealt with in distinct sections, there is no essential break in Dr. Kirkaldy's treatment of his subject and the book is in many ways in the nature of an extended essay. A preliminary part discusses the basic geological concepts. In a section on Physical Geology and Geomorphology the geographical background of the reader is kept in mind and examples are taken mainly from Great Britain, particularly from southern England; topics such as semi-arid and arid regions are dealt with only briefly. There is a useful chapter on the evidence used in the reconstruction of denudation chronologies. A large part of the book is concerned with Petrology and Mineralogy. This is wide in its scope and includes not only a consideration of the chief minerals and rocks but also a short discussion of the petrological microscope. Tables give summaries of the characteristics of the main crystal systems and the most commonly occurring minerals. New ideas on the nature of igneous and metamorphic rocks are briefly indicated. Palaeontology and Stratigraphy are taken together in the section on Historical Geology: here, well-chosen examples are used to illustrate the means by which the principles of stratigraphy and the reality of evolution have become established. The fair and well-balanced picture of the developments in modern geology that Dr. Kirkaldy has given is perhaps best shown in the section on the composition and origin of the earth. Throughout the book the day-to-day importance of geology is stressed and this is further emphasized in the section on the varied aspects of economic geology.

The book is clearly printed and contains eleven tables and eighty-four line drawings. It would help to have a list of both the tables and diagrams at the beginning of the book. Geographers would probably prefer to see Figure VI, 1, on a different projection. There are a number of misprints, particularly in the sections on Petrology

and Mineralogy and on Historical Geology, which should be corrected in a second edition. The treatment is more philosophical than factual and the reader looking for the maximum number of geological facts in the space of one book on geology will be disappointed. Occasionally, particularly for the beginner, the text becomes a little too condensed. But as a whole the book does show the reader, in a lucid and logical manner, the nature of the problems that are specifically geological and the frame of mind in which they should be tackled. It should be a useful addition to the existing text-books on geology and should fill a gap for many students of geography.

M. M. S.

FURTHER OUTLOOK. By F. H. LUDLAM and R. S. SCORER. With an Introduction by Sir David Brunt. *London: Allen Wingate*, 1954. 9×5½ *inches;* 174 *pages; illustrations.* 15*s*

The title is merely a figurative application of the familiar phrase in the weather forecast, since the main purpose of this book is an exposition of the development of meteorology at the present juncture. This exposition by two young authors who have themselves made important contributions to meteorology is clearly put in relation to the earlier knowledge and there is none of that iconoclastic scrapping of older conceptions, so disheartening to students, by authors who often forget that much of what masquerades as "new" is often old ideas in a fresh garb.

The chapters include weather processes, turbulent motion, gliding (which has added enormously to our knowledge of the atmospheric circulation), weather forecasting as art and science, and the control of weather as regards micro-climate, atmospheric pollution and especially the production of artificial rain by the seeding of clouds. The authors point out that, though it is too soon to say how far rain-making on these lines will go, the probability is that it will be restricted to the seeding of clouds of the local cumulus type, and so mainly useful in drought-affected regions like Australia. Perhaps this is as well in view of the legal problems which would follow any rain-making practice on a large scale, as to which the authors show themselves well aware. They do not, however, discuss the rather recondite question as to whether artificial rain would be deducted from, or added to, the natural rainfall over the globe as a whole, though they do imply that in the latter alternative evaporation would have to be speeded up to restore the hydrological balance.

As to weather forecasting the authors declare that in the short-term day-to-day forecasts progress is certain but that no spectacular results can be looked for owing to the extreme complexity of the weather processes. They are far less explicit about the long-range seasonal forecasting, but seem to favour the study of solar radiation variations as likely to prove most helpful. Weather sequences, while conforming to types, are never exactly repeated, and it is in this infinite variability that we perhaps have the real reason why the problem of precise weather forecasting has so far proved intractable.

L. C. W. B.

CLIMATIC CHANGE: EVIDENCE, CAUSES, EFFECTS. Papers by twenty-two authors; edited by Harlow Shapley. *Harvard University Press, Cambridge, Mass.* (*London: Geoffrey Cumberlege, O.U.P.*), 1953. 9½×6 *inches;* xii+318 *pages; diagrams, maps, illustrations.* $6.00 (48*s*)

Geographers are basically explorers and map makers. Now that the world has been mapped and the regional geography written, the next stage is to explore the rate of change of the environmental factors, physical and human; indeed a far more difficult task resembling on a grander scale that of the synoptic meteorologist. It is a problem in turbulent flow. Historical geographers likewise concern themselves with evolving patterns; geomorphologists face the complexities of rates of change of the lineaments of the landscape. In general, however, such changes take place on a time-scale of little significance to man, conscious as we are of our late arrival. Some departments of geography accordingly make a fair case for paying little attention to

geomorphology; but the present writer would be loth to deny to students the opportunity to explore rates of change in whatever aspect of the earth's surface they wish.

Climatology discusses the much more fluid element of environment whose vicissitudes are a matter of immediate concern. Translation of potential into kinetic energy is chiefly accomplished in the cooler temperate zones, and any drag on that energy, especially that imposed by cold, is fundamental to our welfare. So fundamental, indeed, that the provision of the evidence for climatic variation and its subsequent discussion resembles all the grander geophysical problems in that it lies beyond the scope of any single group of scientists.

No geographer can afford to disregard current activity in this lively field; too lively perhaps for some, who turn with relief to rejoin the solemn march of the geomorphologists. Customarily indeed the student can very fairly stop at C. E. P. Brooks' 'Climate through the Ages,' and testimony to that justly renowned single-handed work of integration, first published in 1926, becomes evident in the work under notice. Twenty-two papers, some challenging and highly specialized, bear witness to the breadth of the subject and its developments. Dr. Shapley provides a cheerful explanatory introduction to these results of a two-day conference organized by the American Academy of Arts and Sciences in May 1952; as he says, "Climatology of the past and present is one of the most painstaking of the disciplines that bring scientists together." Apart from Dr. Schulman of the University of Arizona, who provides an up-to-date paper on tree-rings, all the contributors were within range of New England (nine Harvard, five Yale). Six might be deemed astronomical, four meteorological; the remainder are largely concerned with field evidence. The range of papers is thus wide, uneven and stimulating. Like a team of sledge dogs, the twenty-two pull in several directions; but they do pull.

To review such a collection in detail is impracticable: each reader must find his own points for criticism. Several of the authors are not so well known on this side of the Atlantic and their outlook is refreshing. Papers which will appeal to many readers of this *Journal* include C. S. Coon on Climate and Race, and P. B. Sears who as an ecologist discusses climate and civilization. Some of Coon's findings appear to parallel recent work on body characteristics and climate by D. F. Roberts of the School of Anthropology at Oxford (*J. Roy. Anthropo. Inst.* **82** (1952); *Man* **52** (1952) 169). To the present writer H. C. Willett's comprehensive paper ("Atmospheric and oceanic circulation as factors in glacial-interglacial changes of climate") makes a valuable summary of the ideas he has been developing in recent years. He presents arguments against astronomical explanations, and develops his theme of irregular variations in solar activity, following the now widely accepted opinion that recent climatic fluctuations differ in degree but not in kind from the greater variations in the past. Barbara Bell discusses possible effects of variation in solar corpuscular radiation, the only known source of energy that acts exclusively in high latitudes. Wexler on variations in radiation balance revives interest in possible effects of volcanic eruptions, a point made some years ago by V. E. Fuchs and T. Paterson (*Geol. Mag.* **84** (1947) 321–33); Wolsbach argues the insufficiency of geographical causes of climatic change; Menzel, Krook, Bhatnagar, van Woerkom and Brouwer add to the astrophysical arguments.

J. T. Hack gives a critical review of the well-known paper by Büdel (*Erdkunde*, 1949) on the climate of Europe in the Würm; R. F. Flint reviews field evidence and the similarity between N. American and European late-glacial events. J. L. Kulp discusses radioisotope dating; Nikiforoff discusses soil studies as indicators of climatic change. Later contributions are largely concerned with biological evidence. Of these, perhaps the most interesting to British readers will be the long paper, almost a text, on "Paleolimnology" by E. S. Deevey, abounding in references. When it is considered how little has been done in Britain, apart from Winifred Pennington's classical study of Windermere (*Phil. Trans.* **233**B, 1947) it is evident that here is a potential field for northern university effort.

The full study of climatic change demands an enormous range of knowledge and capacity to criticize and interpret a wide variety of evidence. Too frequently the meteorologist is not so equipped, so that the study must proceed by a series of approximations, much assisted by conferences of this kind. That the field is active is shown by the prominence of such discussions in recent international meetings and elsewhere ('Toronto Conference Proceedings,' Roy. Met. S., 1954; papers at Stockholm, in Tellus 1949 onward; 'Compendium of Meteorology,' Amer. Met. S., 1952; Estienne's review in *Rev. Geogr. Alpine*, 1952; numerous German papers, *e.g.* by Flohn, Poser, Klute). Yet many of us who recall C. E. P. Brooks' papers about 1916–26 will observe with interest how many of the familiar cockshies are again set up. Continentality, Permian glaciation, vulcanicity, carbon dioxide, sequoias, orbital elements all reappear; little reference is, however, made to the newer work on ocean-bottom cores (*cf.* Wiseman and Ovey, *Proc. Geol. Ass., Lond.* **61** (1950) 28–84 and Wiseman, *Proc. Roy. Soc.* **222**A (1954).

What has been added in the past thirty years is very largely in the field sciences and it is there that we must look for further progress. Radio-carbon dating, geochemical investigations, glaciological studies of polar ice caps can all be expected to yield answers to a variety of questions within the next few years. The astronomer and the meteorologist may then be better able to offer an explanation of those environmental changes which, according to some, provided that series of stimuli which, for good or for ill, have given us European civilization, Plato and smog, not to speak of refrigerators for the tropics. Some may call it geophysics, some will say that it remains a proper branch of study for geographers; this admirably produced collection of papers can be recommended for reading. And, remembering how much of the stimulus to these active studies derives from one of this Society's Medallists, Dr. Hans Ahlmann, many geographers will continue to believe that they too can try to open up new horizons. G. M.

TRAITÉ DE GÉODÉSIE. Tome I Fasc. II, Tome II. By P. TARDI et G. LACLAVÈRE. *Paris: Gauthier-Villars*, 1954 *and* 1955. 10×6½ *inches;* x+389 *and* xiii+366 *pages; illustrations and diagrams.* 3700 *fr. and* 3000 *fr.*

The whole treatise under this title, in four volumes, is a revision and enlargement of Tardi's two-volume work of 1934. The first part of Vol. 1, published in 1951, is devoted to mathematical foundations, instruments and methods of practical geodetic measurement. Of the volumes now reviewed, Part II of Vol. 1 contains chapters on spheroid geometry, geodetic calculations, map projections and adjustment of observations. The geometrical theory, as usual in treatises of this kind, weighs heavily on the side of geodesics and the differential geometry of surfaces, but there is some discussion of plane sections. In the next chapter, the reader will not find a complete account of any of the sets of formulas, well known to geodesists under the names of Clarke, Puissant and others for the calculation of geodetic coordinates, bearings and distances; instead, some special formulas are developed from pieces of the foundation of Clarke's Formulae in Legendre's Theorem. No doubt they are adequate for their purpose. Dalby's Theorem is used for the bearing convergence. The chapter ends with a mathematical treatment of long geodesics. In the third chapter the authors decline to deal with any other than orthomorphic projections, on the ground that only such projections are proper to the domain of geodesy. The chapter is therefore a treatise on conformal representation. Properties of the standard orthomorphic projections, and some peculiar ones, are investigated mathematically. Scale errors, arc-chord angles and other important details are explained. In the last chapter processes of adjustment based on the principle of least squares are described, with reference mainly to triangulation. The classical approach by adjustment of observations to satisfy exact conditions, and the more modern applications of the idea of variation of provisional values, are fully explained with the aid of numerical examples. The problem of adjustment of very large systems of triangulation is deferred to Vol. III.

Volume II, devoted to astronomy, opens with a foundation chapter on definitions and theory. Then there is a chapter on Time, Longitude, Clocks, Radio Signals and related subjects. In the rest of the volume, the authors describe all the useful field methods and instruments for determination of Local Time, Latitude and Azimuth, from the precise and elaborate methods with Portable Transit, Horrebow-Talcott Telescope, or Astrolabe, to the more modest processes of "field astronomy" familiar to the topographical surveyor with his theodolite and pocket chronometer. Description of some new types of instrument bring the account up to date. In short, the volume contains a straightforward comprehensive course on astronomy for surveyors and geodesists.

A few misprints have been noticed in the mathematical formulas, but a general criticism must be made in regard to the style of type, which is the same as that used in the 1934 edition. The slightest defect of impression can make a symbol difficult to read, and matters are made worse by the tendency to the use of clumsy notation with tiny suffixes and supersigns. Mathematical symbols need a bolder type. J. E. J.

HUMAN AND HISTORICAL GEOGRAPHY

HISTORICAL GEOGRAPHY. By J. B. MITCHELL. *London: English Universities Press*, 1954. 7×4 *inches;* 356 *pages; maps and diagrams.* 10*s* 6*d*

The latest volume in the *Teach Yourself Geography* series follows the pattern of the previous volumes, which endeavour to present their subjects by methods commonly used by university tutors with individual pupils sitting round their firesides. This book is pleasantly informal and scatters advice on suitable reading throughout the text. It is admirably suited to the needs of those many students who work alone and not as members of a university or college. Moreover, the book is clearly written with complete lack of jargon. In the author's words, the book attempts "to give readers outside the University Schools of Geography some idea of what Historical Geography is, and to interest them in it, so that they may find pleasure in pursuing its study for themselves." Encouragement and advice are given to readers who wish to carry out local work and thus to understand something more about their own district or town. Each chapter is followed by a list of map exercises which the reader can carry out in his own area. Numerous simple maps and diagrams illustrate the volume. In addition to the references in the text a short bibliography is also included. The book is a useful pioneer effort and should help many besides those for whom it is specially intended. E. W. G.

THE ECONOMIC IMPACT OF UNDER-DEVELOPED SOCIETIES: Essays on international investment and social change. By S. H. FRANKEL. *Oxford: Basil Blackwell*, 1953. 9×5½ *inches;* viii+179 *pages.* 15*s*

PROBLEMS OF CAPITAL FORMATION IN UNDER-DEVELOPED COUNTRIES. By RAGNAR NURSKE. *Oxford: Basil Blackwell*, 1953. 8½×5½ *inches;* vii+163 *pages.* 15*s*

It has been widely recognized in recent years that in Britain we have needed new concepts for the economic development and social planning of our dependent territories oversea, and the Colonial Development and Welfare Acts and the Colonial Development Corporation, among other things, have given some expression to this realization. It is unnecessary to underline the shortcomings and misfirings of many of these attempts. Not only have we fallen down badly in practice: we have also proved ourselves very shaky in the theoretical basis of our concepts of these programmes. We are now given, by a single publisher, not one, but two, books on the economic aspects of the problems of the world's under-developed areas, both by acknowledged experts in this field. They are the more valuable because they deal with the problems not only of the under-developed lands but also of their under-developed societies.

No one is better equipped than Professor Frankel to analyse critically and objectively the nature of these problems or to recognize more clearly the significance of all the social implications. He believes that "the time has come for a new assessment of the problem of development of the backward regions of the world," and this varied collection of nine lectures and articles written by him in recent years will stimulate many of his readers to seek a new understanding of, and a fresh approach to, these matters. The essays form two groups. The first is concerned with the theoretical background, and includes Professor Frankel's inaugural lecture as Professor of Colonial Economic Affairs in the University of Oxford. The second group, dealing with some specific problems, includes the Hoernlé Memorial Lecture, "Some reflections on civilization in Africa," and some valuable comments on the failure of the East African groundnut scheme.

Dr. Nurske, Professor of Economics at Columbia University, can also draw on his former experience with the Economic Research Department of the League of Nations. He shows how difficult it is to organize and encourage the investment of capital in economically backward countries; and he sees clearly the nature of the problems that must arise as new wants are created in the minds of the peoples of such areas. For readers without some training in economics it is not an easy book, but it is very authoritative and the effort of following its arguments closely will bring its reward.

Here are two most scholarly and welcome books on a very topical subject. What is also needed is a complementary book of similar quality about the basic geographical problems that have to be faced in the development of the poorer and more backward parts of the world. R. W. S.

NATURAL HISTORY

ASPECTS OF DEEP SEA BIOLOGY. By N. B. MARSHALL. *London: Hutchinson* 1954. 9×6 *inches;* 380 *pages; illustrations.* 35*s*

The seas still remain the great unexplored region of the earth's surface and the mapping of their depths has only begun in comparatively recent times, with the introduction of new techniques. Our knowledge of deep sea biology is also of recent growth for it only began in earnest with the voyage of H.M.S. *Challenger* in 1873. Previously only a few collections had been made from the depths of the ocean, notably those by Sir John Ross in 1817–18 during his search for a North West passage, when he sampled the sea floor at depths of 820, 1190, 1830 and 1920 metres. Each sample contained living organisms: hydroids, worms, crustaceans and a starfish. His nephew, Sir James Clark Ross, during his famous British Antarctic Expedition in H.M.S. *Erebus* and H.M.S. *Terror* also used a dredge and showed that there was an abundant and varied fauna down to 730 metres, but unfortunately these observations did not reach any scientific journals and the collections could not be found after his death. Naturalists a century ago had generally adopted Edward Forbes' view that animal life did not exist deeper than 530 metres. It is now known, however, that life exists in the greatest depths of the sea, and in 1950–52, the Danish research ship *Galathea* under the leadership of Dr. Anton F. Bruun, dredged up sea anemones from depths of over 10,000 metres. The wealth of life in this enormous mass, comprising two-thirds of the earth's surface with an average depth of about $2\frac{1}{4}$ miles, may be contrasted with that on the land surface. Here, except for the occasional flights of winged animals, terrestrial life is confined to a very thin surface layer, whilst in the seas with at least double the area living beings are found at all depths.

The exploitation of this mass presents very considerable practical difficulties, and even at the present time, no really efficient method has been devised of catching the large squids and fishes, which are sometimes washed ashore or found in the stomachs of sperm whales. The use of echo-sounding gear has shown the existence of scattering layers at various levels between 150 and 1000 metres, which often show a diurnal rise and fall at sunset and dawn, characteristic of certain marine plankton. There is some evidence for regarding the scattering of sound in these layers as due to concentrations

of euphausiid shrimps, but the author discusses the possibility of fishes being responsible, as they occur in much greater numbers than is generally realized. Other animals that have to be considered in this connection are squids and siphonophores with their gas-filled floats. The conditions of life in the depths of the seas are fantastic in the extreme. The greater part of the volume of the ocean is pitch dark; pressures range up to about 7 tons per square inch at a depth of 10,000 metres; temperatures below about 1500 metres are in the neighbourhood of 4° C. Yet under these conditions an extraordinary variety of animals and plants manages to exist. Many of these are illustrated by the author: lantern-fishes, hatchet-fishes and other strange forms; species in which a minute male is parasitic on the female; a fish which eats others larger than itself; many brilliantly coloured with rows of luminescent organs; and above all light is thrown on their curious life histories.

The author is well qualified to describe the wonders he relates, and has produced an excellent integrated account of life in deep oceanic waters which should be read by all interested in a wider knowledge of this fascinating subject. The book is well illustrated with many fine black-and-white illustrations and five beautiful coloured plates by Olga Marshall, the author's wife. E. H.

THE UNDERWATER NATURALIST. By PIERRE DE LATIL. Translated by E. Fitzgerald. *London: Jarrold*, 1954. $8\frac{1}{2} \times 5\frac{1}{2}$ *inches; 275 pages; line drawings and photographs. 16s*

When Pierre de Latil was a small boy he became enchanted by marine creatures as he tried to catch them with net or hook. Today, clad in light-weight diving gear and armed with a harpoon-gun, he is a keen underwater naturalist—watching and hunting in the seas off the Provençal coast.

As his interests grew, de Latil became aware of the limitations of books on the fishes of the Mediterranean. He discovered that the authorities were not always in agreement, that they rarely took notice of common experience, and that there was "... a shortage of books discussing the habits of fishes in an interesting and popular fashion, whilst at the same time keeping firmly on the basis of fact." He has admirably succeeded in doing something to overcome this shortage. Moreover, he has been nicely served by his translator. There are a number of interesting underwater photographs and some very good line drawings of fishes by Hubert Williams. N. B. M.

GENERAL

UKENDT MAND TIL UKENDT LAND. By EJNAR MIKKELSEN. *Copenhagen: Gyldendal*, 1954. $9 \times 6\frac{1}{2}$ *inches; 192 pages; illustrations. Kr.19.50*

The recent discovery of "ice islands" or low tabular icebergs in the Arctic Ocean has stimulated Ejnar Mikkelsen into writing a book about an expedition of fifty years ago. His tale is rather disconnected, but lively and interesting. In a book full of reminiscences one can allow that some are faded; in the writings of a man who has spent many years at sea one can even allow a few tall stories—but Mikkelsen shows a disregard for historical accuracy which is hard to forgive. Mistakes appear right from the start. In explaining the *raison d'être* of the expedition he notes: "One fine summer day in 1875" H.M.S. *Plower* (Captain Sherard Osborn) "saw high land rise above the uneven pack-ice outside Camden Bay in the Beaufort Sea." Mikkelsen is evidently referring to observations made from H.M.S. *Plover* more than two decades before; Admiral Osborn died in England during one of the earliest summer days of 1875. But if we forgive such failings, and if we keep 'Unknown man to unknown land' beyond the reach of historians—then there is reason to enjoy it; for it is well written, and full of vivid detail. In May 1906 Mikkelsen and three companions set sail in the *Duchess of Bedford* with the object of searching for land in the Beaufort Sea. The expedition was a failure, though not through lack of effort. It was a bad year for pack-ice, and they were ill equipped for sledging. No land was seen between Camden Bay and their farthest north: lat. 73° N.

Mikkelsen has some amusing things to say about the Society, whose President at the time—Sir Clements Markham—gave the expedition every support. "It was certainly not easy for a young man, who spoke only enough English for everyday use," to appear before a meeting of the Royal Geographical Society and be asked to explain his plans. He found himself "on a platform, looking out over row upon row of blank faces, in which apparently there was not a grain of sympathy or understanding to be read—only quiet forbearance, the same disheartening expression I knew so well in men from whom I sought money—and who had already made up their minds not to give me a farthing." The *Duchess of Bedford* was crushed in the pack-ice, and Mikkelsen started homeward through Alaska. The "unknown land" is quite forgotten during the next hundred pages, in which he deals with adventures among Eskimos, gold-diggers, trappers and robbers. As a raconteur, this is where Mikkelsen comes into his own. In places the descriptions of his companions and of his experiences are first rate, and approach in sheer force and beauty some of Jack London's memorable tales of the Klondyke. C. W. M. S.

SPLENDOUR OF EARTH: an anthology of travel. Compiled by MARGARET S. ANDERSON. *London: George Philip*, 1954. $8\frac{3}{4} \times 5\frac{1}{2}$ *inches; 404 pages; maps.* 25*s*

The late Mrs. Anderson chose the passages in this anthology as (in her own words) "aids to the imagination" in forming mental pictures of geographical features, covering "all standard physical features and all parts of the world, climate of every type and all the types of winds and currents, mountains, seas and rivers that we meet in the atlas" and arranged under chapter headings such as "Tropical climate," "Temperate climate," "Oceans," "Mountains," "Rocks and soil," etc. It was a laudable intention; and of the result it can be said that, like the curate's egg, parts of it are excellent. Authors like Stevenson, Froude, Kinglake, Lafcadio Hearne, Mark Twain and, above all, Kipling, and among the moderns Philip Guedalla, Aldous Huxley, Norman Douglas and E. M. Forster are first-class literary reporters, accurate as well as vivid and imaginative; and the extracts from these really do give the reader something that he could never get from guide books or textbooks. Mrs. Anderson's poetical temperament, however, has led her to quote also from authors less suited to her purpose because more rhetorical, like Belloc, or more fanciful, like D. H. Lawrence, and—what is much more unbalancing to the anthology—to include poems, most of which are not so much descriptive of natural scenes as expressive of emotions about them. On "The Ocean," for example, she quotes from a poem by Mr. Robinson Jeffers calling it "the black crystal, the untroubled fountain, the roots of endurance." This may be good poetry, but it is not very helpful as a geographical description.

Another and even more serious defect is the strangely capricious choice of authors in many sections of the book. Compilers of anthologies, of course, can never hope to satisfy all their readers, some of whom are sure to complain that their favourite authors have been excluded in favour of inferior talent; but complaint is surely justified when on "The Alps," for example, one finds long extracts from the accurate but pedestrian work of Berlepsch, translated by Leslie Stephen, but nothing from Leslie Stephen himself, nothing from Tyndall, Forbes, Whymper or Coolidge and, strangest of all, nothing from John Addington Symonds or Ruskin, who should have been authors after the compiler's own heart. It appears from the introduction that this is partly deliberate: Mrs. Anderson has tried, she says, to avoid using accounts by well-known travellers, since most geographers use these already, and has preferred literary authors and less famous travellers whose works are neglected. It is a natural weakness in anthologists to prefer secondary writers whom they have "discovered" to first-rate writers whom they consider hackneyed; but the best anthologies have not been constructed by that method. With rare exceptions, the better known works are better known because they *are* better, and as an anthology is for reference and not for reading through at a session it is no matter if some of its items are hackneyed, provided that each is the best of its kind.

Nevertheless, the book, taken as a whole, achieves its purpose of "aiding the imagination." One's only regret is that it might so easily have been even better than it is. L. C.

CHAMBERS WORLD GAZETTEER AND GEOGRAPHICAL DICTIONARY. Edited by T. C. COLLOCOTT and J. O. THORNE. *Edinburgh and London: Chambers*, 1954. $8\frac{1}{2} \times 5$ *inches;* viii+792 *pages.* 30*s*

This volume is a valuable addition to the short list of authoritative works of reference which should find a place in any geographical library. In scope it lies between the indexes to the leading reference-atlases and the exhaustive gazetteers such as the Columbia Lippincott. It has, however, some special features which increase its utility. It contains, for instance, numerous short articles on geographical subjects; and it has a supplementary index of names mentioned in articles but which do not appear as headings. Checked against what the reviewer knows, the information seems to be full and up to date. In fact, much of the text is evidently the work of professional geographers. Foreign Roman alphabets are rendered with due care to diacritical marks (Turkish names, for instance, appear to be correct), and names taken from non-Roman alphabets and scripts are given in good transliteration and transcription. Such firms as Lutsk and Lvov show that the federal rather than the local firms of Russian names have been preferred, but the local are also given in some instances. Consistency in rendering geographical names is hard to attain, but it is unfortunate that preference has been shown for ancient rather than modern Greek in explaining the pronunciation of some Greek names. Fokis (ancient Phocis) for instance, is not pronounced "fosis." English scholars may have so pronounced Phocis, but no Greek would do so. Slight inconsistency shows up in the treatment of some Baltic names. And there are some anachronisms, Pera being given for Beyoğlu (supplementary index). Although Karl-Marx-Stadt is mentioned on the back of the dust cover, it does not appear in the book. M. A.

THE WORLD IN PICTURES

The firm of Adprint has produced three volumes in their series of 'Rathbone Books,' with colourful, shiny covers and scores of coloured pictures, maps and diagrams. The largest, ADVENTURE OF THE WORLD (*Adprint*, 1954, 10*s* 6*d*) by James Fisher, is described as "a luxury book." the two smaller ones are called THE WORLD IN PICTURES: I. Mountains and Valleys; II. Icebergs and Jungles (*Adprint*, 1954, 4*s* 6*d each*), and are by S. Carpenter, M. Neurath and S. Irwin. All have an American flavour and seem to possess something of the paraphernalia of the films, with Director, Producer, Art Editor, Technical Adviser and so forth. The pictures are fascinating, the diagrams simple, the maps have charming colours and many attractive details while the text, which is limited, is somewhat abstract and general. The colour and the pictorial presentation of things that are not always simple suggest that the books are intended for the young, but the text seems rather difficult for such, and to need for its understanding the background of the adult. What, for example, would the young reader make of the following: "The sun's heat comes from the changing of matter into energy by atomic fission; part of it received by the earth is about 1,000,000,000,000,000 horse power"? Perhaps, however, the books are intended for the enquiring adult and indeed many mature readers would find in them much of interest and instruction.

Some details call for criticism. There is, for example, a charming illustration (page 10, 'Icebergs and Jungles') of a cloud moving along horizontally, retaining its shape but increasing in size and density and dropping increasing amounts of rain. Adjacent to this is another diagram with a cloud rising gracefully over a mountain on the slopes of which it drops rain. This kind of misrepresentation without any warning note in the text seems undesirable for any age. Other examples could be given and it

would seem that the problem of presenting important implications has not been completely solved.

The two smaller books deal with topics suggested by their titles, covering both physical and human aspects. The treatment has a scientific flavour which is perhaps too confident in tone but is likely to appeal to many. 'Adventure of the World' has three main parts: "How the World Began" (including a geological summary), "The Form of the World" (a geomorphological summary) and "Man's World" (which includes a peep into the future with a striking picture showing most elaborate roads, colossal buildings and amazing transport as well as a man wearing a bowler hat and carrying a brief case). L. S. S.

Similar in style to the "Rathbone Books" is THE GOLDEN GEOGRAPHY, No. 5 in the "Giant Golden Books Series" (*Adprint*, 1954, 10*s* 6*d*). This handsome picture book by Elsa Jane Werner with illustrations by Cornelius de Witt, is sub-titled "A child's introduction to the world," and appears suitable for boys and girls up to about eleven years old; it is strangely reminiscent of the nursery lesson-books of a generation ago. Spirited and diverse pictures in brilliant colour offer an immense amount of information, and it is not surprising that some of the maps and natural features shown are a trifle over-simplified. D. M.

RECENT BIOGRAPHIES

"Hardly anyone who received a letter from Gordon ever threw it away:" this cry from the heart of a conscientious biographer occurs halfway through Lord Elton's GENERAL GORDON (*Collins*, 1954, 25*s*). Elsewhere the author observes that he has read "many hundreds, I could almost say thousands" of letters, and there are times in this otherwise excellent account of an extraordinary man when Lord Elton appears almost swamped by the volume of Gordon's correspondence. He makes too much, for instance, of certain spiteful references to Samuel Baker and to Waller in letters written from Equatoria when Gordon's nerves were more on edge than his biographer, eager to paint the image of a soldier-saint, is prepared to admit. Lord Elton's rather unworthy dismissal of Baker's work in Equatoria, where the older man did much to prepare the way for Gordon, seems to be based on Gordon's private letters rather than on the historical record. The purpose of the book was not, however, to place Gordon as an explorer and administrator in relation to his contemporaries. The author is not concerned primarily with his hero's official career but with the inner man, in particular with the evolution of a highly individual faith, and he succeeds remarkably well in presenting a composite picture of a religious fanatic who was, at the same time, a highly competent soldier. The most successful chapters are those on the Chinese period, when Gordon's unique qualities had scope as never before or perhaps after. The Khartoum dossier is examined in great detail, and the verdict is emphatically for Gordon, and against Gladstone and the Government of the day. Apart from the merits of the case as they appear on paper, Lord Elton is surely putting his finger on the root cause of the disaster when he says that if the Government had "wanted caution they should not have called in Gordon. . . . It was folly to send out a solitary man of genius and then forbid him to exercise his genius."

Only the tragedy of Khartoum prevented Gordon from serving in the Congo with Stanley, another Victorian giant whose fluent pen has sometimes defeated those anxious to imprison him within the pages of a book. Monsieur Albert Maurice has discovered a most interesting and hitherto unknown collection of Stanley's letters. They cover the year 1881–1882 and are contained in a "Letter Book" into which Stanley copied his official correspondence during the period in which he forced his way from the mouth of the Congo as far as Stanley Pool, where Léopoldville stands today. STANLEY: Lettres inédites (*Office de Publicité, S.A., Bruxelles*, 1955) includes an account of the foundation of the Association Internationale Africaine, under the aegis of which the Free State of the Congo was to come into being; the letters are

interspersed with occasional editorial comment, and Monsieur Maurice brings the story up to 1884, the attainment of Stanley Falls and the recognition of the Free State at the Conference of Berlin. Although there is nothing startling or new in the letters, they are valuable as a collection because, thus concentrated, they convey a powerful impression of the magnitude of Stanley's task. There are letters to Colonel Strauch of the Comité d'Études du Haut Congo and to King Leopold himself, asking for staff and equipment; there are instructions and protests to subordinates; there are progress reports. Fever was rife, the local inhabitants often hostile and, apart from the truculent Lindner, no one of Stanley's own stature to leave in charge of the hardly won stations on the river, each of them at once a new point of departure and a possible refuge in retreat. The book as a whole is, inevitably, a trifle clumsy in composition; it would, for instance, be interesting to have a rather more succinct account of Stanley's race with de Brazza, but the letters were well worth publishing. Monsieur Maurice writes with enthusiasm and a frequently happy turn of phrase—what better summing up of Stanley could there be than "chatouilleux et fantasque?'

D. M'

TRAVEL BOOKS

Two recent books illustrate very well two distinct approaches to travel: Lennox Cook went round the world on a motor-bicycle in order to resolve his own inner conflicts, while Charles Barrett, a distinguished Australian naturalist, has travelled and worked for some years in Papua and New Guinea in search of the wonders of the visible world. Mr. Cook's is by far the better book from a literary point of view (THE WORLD BEFORE US. *Collins*, 1955, 15*s*), but in spite of his excessively colloquial style most people would find Mr. Barrett a more attractive travelling companion (ISLES OF THE SUN. *Heinemann*, 1955, 25*s*). The irascible and introspective Mr. Cook leaves one in no doubt that to accompany him on a motor-bicycle across four continents would be a testing experience, and many readers will feel a distinct sympathy for Tim whose good nature and efficiency did so much to make the journey possible. The book is, nevertheless, a *tour-de-force* in conveying the impact of actual experience without the glamour which later reflection usually imparts. Mr. Barrett, on the other hand, is never at odds with his environment: whether studying the megapodes, or "incubator-birds," of New Guinea and the adjacent islands, attending a "grand sing-sing" in the foothills of Mount Hagen, trying to catch alive the deadly taipan snake of Queensland or "hob-knobbing with ribbontails, sicklebills, bluebirds and other aristocrats," he is equally happy and absorbed. He is particularly interesting on the experiments in pest control of which he was put in charge, involving the import from East Africa of quantities of parasite wasps to prey upon the beetles which destroy the coconut palms of New Guinea. 'The world before us' has excellent maps, 'Isles of the sun,' beautiful photographs.

Lesley Blanch's brief biographies of four nineteenth-century women is a travel book with a difference (THE WILDER SHORES OF LOVE. *Murray*, 1954, 15*s*). A favourite General Knowledge question—"What have these four characters in common?"—might at first sight be answered by—"They all sought fulfilment in travel," but such is not really the case. Isabella Burton and Jane Digby were engaged in woman's perennial vocation, the pursuit of her man; Aimée Dubucq de Rivery, kidnapped and incarcerated in the Seraglio, can hardly be said to have travelled voluntarily at all; alone of the four, Isabelle Eberhardt approximates to one's conception of the traveller as a distinct species. The juxtaposition of these women is, in fact, arbitrary, but it is justified by the entertainment Lesley Blanch provides in so attractive a presentation of four heroines. There are holes to pick, of course: no one will quarrel, in a book written to amuse, with imaginative reconstructions, whether of life in the Seraglio or in the Consulate at Trieste, but it is a pity when known facts are falsified. To imply in the text, and to state baldly in the index, that Speke committed suicide, is somewhat shocking in view of the Coroner's verdict after the incident, of contemporary

accounts by such men as Francis Galton and, not least, in view of what is known of Speke's character. Nor does our authoress, launched on the wings of inspiration, give any authority for such statements as "He [Speke] was of a moody and depressive nature, and was said to have first plunged into exploration because he set so little value on life."

Elizabeth Nicholas deals with the practical side of travel but she contrives to be an imaginative as well as a reliable guide to the holidaymaker. The first part of THE TRAVELLER'S YEAR (*Evans*, 1954, 12*s* 6*d*) is divided into a chapter for each month, in the course of which the author suggests the best places to go. In the second part of the book, she runs through the months of the year and what they offer in a selection of European countries—a special warning is issued against November and December anywhere. National menus and meteorological tables are thrown in for good measure. The illustrations by Billee Butler and the plentiful photographs combine with a well-informed text to make a useful and attractive handbook.

A FLIER'S WORLD (*Hodder and Stoughton*, 1954, 12*s* 6*d*) takes the armchair traveller, with something of a jolt, not to a far continent but into a totally new element. Wolfgang Langewiesche, an American pilot of German origin, explains with extraordinary lucidity the positive transformation of a would-be pilot from a land animal into an air animal. In terse American English he describes the masses and currents of the air, or "stuff," which he likens to molasses and which, he convinces one, has as much consistency and movement as the sea. Having launched his reader fairly into the new element, Mr. Langeweische encourages him to cast a geographer's eye on the ground below. He describes most effectively how easy it is, for instance, to understand the economy of Siam after flying over endless rice fields and interminable forest; for a pilot to see why the Rub' al Khali is "the empty quarter;" and to give a history lesson on the contrast between the manorial organization of the old French countryside and the independent one-man farms of New England. D. M.

THE SOCIETY'S NEWS

MEDALS AND AWARDS, 1955

Her Majesty The Queen has been pleased to approve the award of the Royal Medals as follows: *The Patron's Medal* to Dr. John K. Wright, lately Director, American Geographical Society of New York, for services in the development of geographical research and exploration, and *The Founder's Medal* to Commander (L) C. J. W. Simpson, D.S.C., R.N., leader of the British Expedition to North Greenland, 1952–4. The Council have awarded the *Victoria Medal* to Sir John Russell, O.B.E., F.R.S., for his studies of soils and agriculture and for services to geographical education. The *Murchison Grant* has been made to Dr. H. C. K. Henderson, Lecturer in Economic Geography, Birkbeck College, London University, for studies in economic geography; the *Back Grant* to Captain O. C. S. Robertson, G.M., R.D., R.C.N., for his journey through the North-west Passage in one season in the icebreaker *Labrador*; the Cuthbert Peek Grant to D. G. A. Bunker, for geographical exploration and mapping in south-west Arabia. The *Gill Memorial* goes to Dr. Marjorie Sweeting, Lecturer in Geography, University of Oxford, for contributions to the physiography of limestone areas, and the *Mrs. Patrick Ness Award* to Dr. E. F. Roots, senior geologist, Norwegian–British–Swedish Antarctic Expedition, 1949–52.

RETIREMENT OF SIR WINSTON CHURCHILL

Sir Winston Churchill was elected into Honorary Membership of the Society in 1948. Few have travelled more widely or more adventurously, or displayed so vividly in their work the youthful spirit of exploration and daring. Few have been more conscious of the influence of physical environment in shaping the fortunes of mankind, whether it be in the design and execution of great strategic enterprises, or in the reconstruction of the grand panorama of history. It is fitting that Sir Winston Churchill's recent retirement from the office of Prime Minister, an office which he, the greatest Englishman of modern times, has filled for so long and with such remarkable distinction, should be recorded in the pages of the *Geographical Journal*.

GRANTS TO EXPEDITIONS, 1955

The Council has approved grants for 1955 totalling £975 from the Exploration Fund, £75 from the Stephens Bequest and £80 from the Penruddocke Bequest to twelve expeditions; approval has been accorded to three others. The Oxford Exploration Club receives grants as follows: £150 and loan of instruments for exploration of the Usun–Apaul Plateau, Sarawak; £75 and loan of instruments for an expedition to North East Land; £50 for an expedition to the High Atlas, mainly devoted to botany and zoology. The Nottingham University Exploration Society receives £50 plus loan of instruments for eight weeks in the field in north-west Spitsbergen and the Durham University Exploration Society £25 for the completion of the survey of Tindfjallajökull in Iceland. Dr. W. V. Lewis's Cambridge University Expedition to investigate glacier movement in Norway is granted £100 and the loan of a special theodolite. H. J. Savory receives £25 for a preliminary survey for studies of agricultural and historical geography in certain districts of Yugoslavia; J. B. Heaney, £250 for scientific work on Gough Island in the South Atlantic; O. R. de Baer, of Cambridge, £50 for exploration and survey in north-east Afghanistan; Duncan Carse, £200 for the completion of the South Georgia Survey. R. B. Blatcher and P. J. Murphy, both of Cambridge, receive £50 and £30 respectively from the Penruddocke Bequest—the former towards an expedition to gain field experience in tropical forest and savannah areas of the Belgian Congo, and the latter towards the further study of irrigation and

agriculture in French Morocco. P. J. Williams' party has £75 from the Stephens Bequest towards the continuation of last year's field investigations into solifluction phenomena in northern Norway. The Council has also approved the programme of H. J. Latter of Cambridge in Scoresby Land, and has accorded approval with loan of instruments to H. A. Lamb (Cambridge), who is going to the upper reaches of the Spiti river to investigate the Spiti Shales, and to the Welsh Himalayan Expedition to north-west Nepal.

"PEARL OF THE ORIENT," EXHIBITION OF PHOTOGRAPHS OF THE PHILIPPINES

Under the auspices of the Society, an Exhibition of nearly a hundred photographs of the Philippines, taken by the Shell Photographic Unit, was on show in the Society's galleries from March 23 to April 7 under the title "Pearl of the Orient" (Perla del Oriente), the old Spanish description of the Islands. The photographs, illustrating many aspects of the geography and history of the Philippines, were taken by Mr. Derrick Knight, Chief Photographer of the Unit. The Exhibition, which was mounted by the Shell Company in cooperation with the Society, was opened by His Excellency the Philippine Ambassador, Mr. Leon Ma. Guerrero. The President of the Society, General Sir James Marshall-Cornwall, on behalf of the Council, welcomed the Ambassador and a number of distinguished guests, including Mr. J. W. Platt, Managing Director of the Shell Company, and spoke in his opening remarks of the geographical and historical importance of the Islands, and especially of the remarkable industrial and economic developments which had been such a feature of the post-war rehabilitation programme under the new Republic.

Mr. Platt referred in his speech to his Company's interest in forwarding exploration, and in the promotion of the visual side of geographical education through the activities of the Shell Film and Photographic Units. The Ambassador then opened the Exhibition and described as particularly felicitous the cooperation between the Society and the Shell Company which had enabled such an Exhibition to be staged in the chief British centre of geographical exploration and research. After the opening, the President and Council entertained the guests in the New Map Room. The Exhibition, which was open to the public, was visited by a number of parties from schools, as well as by Fellows and Associate Members of the Society and their friends.

Moro village on Mindanao Island, showing traditional "vintas" (sailing craft) and huts on stilts

Photo: Shell Photographic Unit

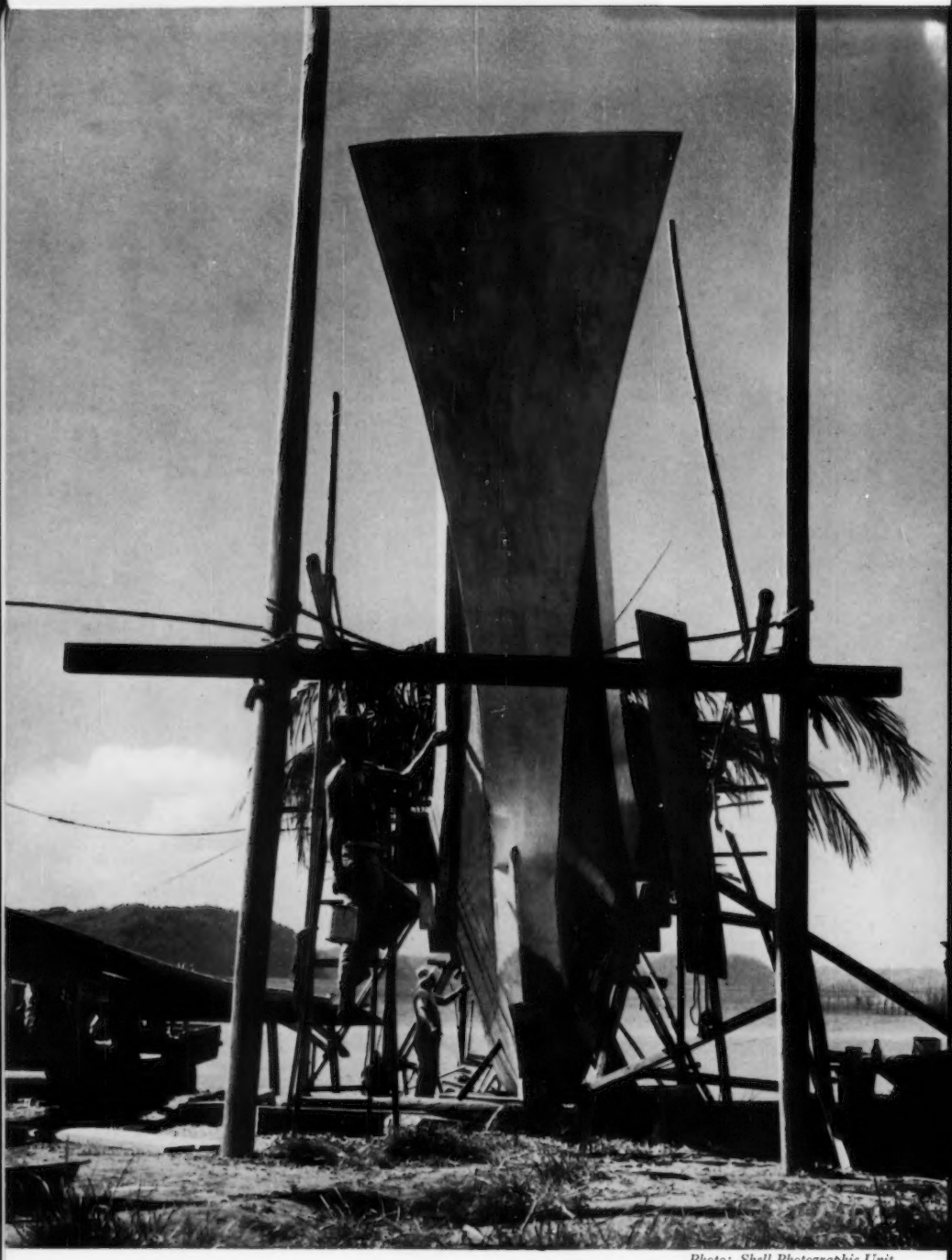

Photo: Shell Photographic Unit

Painting a "pareo" or large sailing boat, Panay Island, Philippines

THE RECORD

CONTRIBUTORS TO THIS ISSUE OF THE *JOURNAL*

Charles Evans, F.R.C.S., was a member of the British Mount Everest Expedition, 1953, and (as deputy leader) took over the leadership of the New Zealand Himalayan Expedition in 1954 when Sir Edmund Hillary fell ill; he is at present leading the Kanchenjunga Reconnaissance Expedition. *Dr. T. E. Armstrong* has been Research Fellow in Russian at the Scott Polar Research Institute since 1947, and received the Cuthbert Peek Grant in 1954 for studies in the history and economic development of the Arctic. *Peter Scott* was from 1948 to 1952 Lecturer in Geography at the University of Cape Town, and is now Head of the Department of Geography at the University of Tasmania. *Monsieur Jean Robin*, formerly "Commandant du Cercle de la Baie de Lévrier," at present holds the post of Director of Political Affairs of the Ivory Coast at Abidjan, French West Africa. *Dr. K. S. Sandford* has been Reader in Geology in the University of Oxford since 1948 and was awarded the Murchison Grant in 1932. *G. W. Murray*, the Society's Gold Medallist for 1936, was for many years Director of the Topographical Survey of Egypt. *R. M. Prothero*, Lecturer in the Department of Geography, University College, Ibadan, is at present working in the field as a Research Fellow attached to the West African Institute of Social and Economic Research.

UNIVERSITY NEWS

UNIVERSITY OF HULL

The establishment of a Chair of Geography in the University of Hull is announced. Mr. H. King, who has long been Head of the Geography Department, has been appointed Professor.

UNIVERSITY COLLEGE OF SWANSEA

Professor W. G. V. Balchin delivered his inaugural lecture as first Professor of Geography in the University College of Swansea on 3 February 1955 and chose for his theme the subject of "Research in Geography." A broad survey of research currently in progress in geomorphology, climatology, historical, economic and regional geography was followed in each case by an outline of possible future trends and lines of work. Special attention was also drawn to the unique geographical facilities available in or near Swansea for much fundamental research. The Gower peninsula forms a natural field laboratory for the geomorphologist and climatologist whilst South Wales as a whole has yet to be seriously studied by the historical and economic geographer. Reference was also made to the rapidly rising and extensive new building which will house the Department of Geography at Swansea in the near future. The inaugural lecture is being published by the University of Wales Press Board and copies may be obtained (gratis) on application to The Registrar, University College of Swansea, Singleton Park, Swansea.

GEOGRAPHY IN THE SOVIET UNION

The present position of Soviet geography is discussed in a recent article by Academician E. Pavlowski, President of the U.S.S.R. Geographical Society, and S. Kalesnik, Associate Member of the U.S.S.R. Academy of Sciences. Published in *Izvestia* for 16 February 1955, the article discussed the results of the Second Congress of the Society, and the following paragraphs extracted from it give some idea of the work being done and encouraged on geography in the U.S.S.R. today.

". . . . Territories, well known already, including those densely populated, are also being studied profoundly and from every angle. A hydrological register of the

country has been compiled, remarkable works of Soviet cartography have been created, such as a millionth scale map of the U.S.S.R., hypsometric maps of the U.S.S.R., a sea atlas, an Atlas of the World. Composite reviews on climate, soil, vegetation and the animal world have been compiled, and essays have been written, testifying to the rapid development in our country of geomorphology, the study of ever-frozen ground, hydrology and other branches of geographical knowledge. . . .

"The U.S.S.R. Geographical Society is striving to solve the problems which are vital from the theoretical and practical aspect in geography, to further the development of the national economy and culture of the country, to bring about an improvement in the organization of geographical education and to spread geographical knowledge. . . .

"Since the Congress of the Society in 1947 the main attention of Soviet geographers has been concentrated on questions of transforming nature. The geographical conditions of the regions of irrigation and flooding, afforestation and the construction of large-scale hydro-technical installations have served as the most important subjects of field research and scientific reports at conferences. . . .

"There is also the necessity for wider generalization of assembled facts. This will help to sum up many years' work and will be a kind of guide in planning new research. In this respect geographers have as yet done little. A tremendous amount of scientific geographical material collected by numerous expeditions has accumulated, but far from all this material has been generalized and published. So far there has been no detailed regional geographical description of our country, and few composite works on the complex geographical features of foreign countries, in particular the countries which are people's democracies. . . .

"The practical activity of geographers should not overshadow theory. In recent years theoretical discussions have developed on certain of the most acute geographical questions. They should be encouraged in every way. Wherever argument ceases, science fades. In order to raise the standard of discussions, they should be given a more concrete and organized nature and they should be carried on not on several very important problems at once, but consecutively on individual questions.

"The training of cadres of geographical specialists should meet the requirements of the day. It is first and foremost a question of the higher education establishments. Taking into consideration the specific nature of geographical science and its differentiation, they should compile curricula in such a way as to combine advanced specialization in some branch of geographical knowledge with extensive general geographical training. It is understandable that the narrow specialist cannot solve scientific questions in the way that is now necessary both for science itself and for the national economy. At the same time no important geographical specialized study should be deprived of the right of independent existence in geographical faculties, as was done recently by the Ministry of Higher Education of the U.S.S.R. with regard to geomorphology and biogeography.

"It should be remembered also that there are only a few dozen doctors of geographical sciences at present in the country; they are being replaced extremely slowly. The position can and must be improved by developing post-graduate and higher degree study in the geographical sciences. . . .

Soviet geography needs further scientific organizational consolidation. Geographical sciences, despite their complexity, are still extremely poorly represented in the Academy of Sciences of the U.S.S.R., in which there is no independent geographical department. In the Academies of Sciences of the Ukraine, Tadjikistan and Uzbekistan there are no geographical institutions at all. Geographical institutions are distributed extremely unequally; for example, there are hardly any in Siberia and the Far East. If it is right that the Institute of Polar Agriculture should be situated beyond the Polar circle it is no less right that the Ussuriisky Krai should be studied geographically by expeditions sent out not only from Moscow but also from Vladivostok. . . ."

TEN THOUSAND YEARS OF ACCELERATED EROSION

On the steppes of southern Russia various conditions in combination have accelerated the processes of erosion. The acceleration is not, as in many other regions, caused by human agency—at least in the vast unforested region, though deforestation in recent times in bordering areas has caused some extension of the wide zone so affected. The problem is examined in a recent study of the South Russian steppe landscape, by Jean Tricart ("Géomorphologie dynamique de la steppe russe." *Revue de Géomorphologie dynamique*, 4 (1953) 1–36).

The terrain is largely loess, so that rock resistance to weathering and erosion is generally feeble, while "all climatic elements combine so as particularly to favour intense erosion" (Tricart). The snow, falling as it does late in the winter, does not blanket the ground so as to impede its freezing earlier in that season. There is sufficient snow, however, to supply abundant melt-water in the spring thaw. Even the severity of winter is broken by thaws during which water runs and erosion proceeds.

The climatic conditions are such as to favour combination of a variety of processes all intensely active. Under the continental climate there are swift changes from one meteorological extreme to another. Abundant water resulting from coincidence of spring rains, generally of several weeks duration, with rapidly rising temperature and consequent quick melting of snow saturates the soil already thawed above a residual layer of ground ice, furnishing the ideal condition for true solifluction (gelifluction). At this time also the water courses are filled from bank to bank. Though dry for long periods, they are occasionally flooded in other seasons as well, notably by thunderstorms with heavy precipitation during and after a late-summer desiccation that withers the tussock-grass vegetation and deeply cracks and loosens the ground thus bared, facilitating minor landsliding and scour by rainwash.

Tricart's description of the erosion now in progress conveys an impression of its very swift tempo. From observations in France, Cailleux [1] has evaluated the processes of rill wash and sheet erosion as working there at a tempo so slow that their effects are claimed by him to be negligible under existing climatic conditions in humid temperate regions, where at the same time the protection normally afforded by forest inhibits dissection of the surface by new insequent gullies. The abundant run-off of muddy water from slopes, even under forest cover, that may often be observed in New Zealand warns us against making too broad a generalization on the lines suggested by Cailleux; but it is probably quite true that the progressive development of the cycle of normal (humid-temperate) erosion is very slow in many humid parts of the middle-latitude belts—apart, that is to say, from the "linear" erosive work of the constantly flowing rivers.

Such considerations, and realization of the shortness (say ten thousand years) of the postglacial interval, favour adoption of the view that "denudation," as distinguished from river "erosion," is largely a thing of the past in the regions now humid-temperate—or, in other words, that their landscape forms are largely relict, being a legacy from some former climatic condition. Thus interest is maintained in attempts to restore the morphogenic conditions, termed "periglacial," that prevailed during cold ages, when it appears that the tempo of change of landscape form (due to denudation *cum* accumulation) has been much more rapid than it is now.

This is a question apart from that raised by the fact that the very regions in which form now appears to be almost unchanging are those in which remnants of peneplains preserved at the higher levels testify to enormous erosion in long past ages when these surfaces developed so as to truncate even the most resistant rock formations. The very fact that extensive areas with accordant summit levels and even well preserved plateaus of such origin survive, some of them relics of very ancient land surfaces, is itself an indication of the comparative inefficiency of modern erosion, for this has

[1] Cailleux, A. "La ruissellement en pays tempéré non montagneux." *Ann. Géogr.*, 57 (1948) 21–39.

failed either to lower the land surface so as to peneplane it anew or even to efface an older planed surface by deeply dissecting it. However widely the conditions favouring former planation of the land differed from those of modern erosion—however different from today's tempo was that of destructional processes in a climatically different past, whether they were comparable to those now operating in hot-humid or hot-arid belts—there can be no suggestion that the vast peneplains truncating areas of resistant ancient rocks are products of a periglacial cycle, for their development dates from a time long anterior to the ice ages.

It is far otherwise with considerable parts of the subdued mature landscapes of middle latitudes, especially those of moderate relief and with spacing of streams so wide that explanation of land forms based on a theory of insequent stream development may appear inadequate. (In the production of fine-textured dissection as seen in low latitudes and in parts of the middle latitude belts, including much of New Zealand as the writer is aware, erosion by running water concentrated in streams may well, however, have been the dominant process.)

The very fast-working agencies producing youthful dissection, as described by Tricart in the Russian steppe landscape, operate under conditions very different from those usually termed "normal." Though there has been some suggestion of a renewal of erosive activity in response to recent earth movements, which some measurements are claimed to show as still in progress, this explanation is of doubtful value, and rapid erosion seems explicable for the most part if not entirely as a result of a change *to the existing* conditions of climate in that region, a change that must be thought of as inducing a spasm of intensely accelerated erosion. The development of some short gullies that are confined to the steeper parts of slopes, as shown by Tricart in his Figure 6 (copied from Schmidt) and described as "autonomous," is obviously due to an acceleration of erosion. It cannot by any stretch of the imagination be attributed to a tectonic steepening of slopes brought about by small regional earth movement; and so it would seem to be introducing an unnecessary complication of the problem to take earth movements into account, if such are really in progress, to explain any part of the vigorous gullying erosion that has been only for a short time in progress. So fast must be the tempo of change of topographic expression due to the energetic processes Tricart describes as now operating that there can be no difficulty in finding sufficient time for the extensive dissection that has taken place in the steppe region in the few thousand years that have elapsed since the last refrigeration of the earth came to an end.

This dissection is the work of headwardly developing and deeply cut ravines varying in length up to two miles, which now diversify all broad slopes, together with systems of *arroyos* ("dry valleys" of Tricart, locally termed "balkas") of lengths up to 60 miles. Prior to recent dissection of the slopes (which are of no great height—up to a few hundred feet) descending to the floors of main river valleys, the topographic form was presumably like that of any typically periglacial soft-rock region with rather low relief. As it is described by Tricart, this form survives on interfluves as gently rolling plateaus with broadly open, poorly drained hollows; but his Figures 2, 3, and 6 show rather stronger relief than this description implies. The general form suggests comparison with the relict landscape of Central Poland, as described by Dylik,[1] a landscape that preserves without change both constructional and corrasional features developed on very weak terrain by intense solifluction during the Würm age. As Tricart notes, the low plateaus of the Russian steppe are now windswept and are subject to considerable deflation; their form may have been modified and in part controlled by wind in the past. Much of the development of the undulating low-plateau form on a foundation consisting for the most part of Pleistocene loess must, however, be attributed to the strictly periglacial processes operating in glacial ages (not necessarily only the last stadium) combined presumably with the temporary

[1] Dylik, Jan, "On the periglacial character of Central Poland" (in Polish). *Soc. Sci. Lodzensis*, Sec. 3, No. 24, 1953.

development of sharply cut ravines at times (in interstadial intervals) when conditions were something like those of today.

The spectacular postglacial ravining of slopes and the cutting of long arroyos are not attributable simply to a change from periglacial to temperate conditions; nor can the arroyo-cutting, like that of the North American Southwest, be explained as due to a very recent desiccation of climate or a change in rainfall régime.

When Tricart describes the steppe assemblage of forms as "a good example of the semi-arid countries of the middle latitudes" he is referring to those with very cold winters. In this region freezing of the ground takes place to a depth of five or six feet. Thus the processes of gelifraction and solifluction have not entirely lost their importance in postglacial time. They are still active in the spring; but, in addition, the efficacy of scour and removal of waste by running water are now enormously greater (especially in the warm spring, when the snow melts) than they would be in a truly frost-bound periglacial region (with perennially frozen ground) such as this was, without doubt, in the Würm ice ages, more than ten thousand years ago.

The arroyos, though they are called by Tricart "dry valleys," are not at all analogous with the features so called in limestone terrains. They are also quite unlike the "dry valleys," so called by Dylik, of the Polish relict periglacial region, for the latter do not contain any stream courses. The arroyos of the Russian steppes are, on the other hand, like those of the American Southwest, the actual courses of ephemeral streams; they are occupied by stream floods when the melt-water from winter snows is reinforced by the spring rains, and also at odd times after heavy rains later in the year. Like the American arroyos they are thus obviously stream-cut forms at present actively developing. Flatness of their floors, described by Tricart, is the result of the functioning of the whole valley bottom as a water course.

In the spring and even during periods of thaw during the winter not only does water stream down the side slopes and flood the channels of arroyos, but solifluction functions also to help dismantle the slopes.

Though, according to Tricart, summer heat and drought contribute appreciably by restricting vegetation and cracking the ground, it seems obvious from his description that the rapidity of denudation by dissection is due very largely to the cooperation of residual "periglacial" phenomena with the postglacially increased activity of running water. The steep-sided and steep-headed form of the numerous ravines and of the arroyos, which are simply ravines greatly elongated by headward erosion, show that they are water-cut valleys largely of insequent development in postglacial time, which have already submaturely dissected large parts of the quite extensive interfluves separating the valleys of the main rivers, attaining depths of up to 300 feet. That their pattern is for the most part not of *recent* insequent development is made apparent by some of Tricart's illustrations and by his description (p. 7) of typical side-slope profiles. His Figures 2 and 3 in particular show an arroyo and a ravine head as features obviously rejuvenating existing widely-open valleys of the subdued upland landscapes. Such features are evidently characteristic diversifying forms of the low plateaus forming the interfluves. The fact that such hollows are poorly drained ("à écoulement incertain") does not preclude the possibility (probability, indeed) that drainage was well integrated in interglacial (or interstadial) times, when climatic conditions must have been like that of today but dissection (if, as seems probable, these intervals can be assumed to have been long enough) had proceeded further. The ravine-cutting process of erosion by melt-water and rain-fed streams having been halted, however, by stadia of climatic refrigeration, periglacial smoothing of landscape form under intense solifluction, with the activity of winds carrying dust and sand (still effective), account fully for disintegration of drainage. Sheetfloods are still sweeping fine debris into the hollows.

Tricart continues his article with an account of an ambitious plan now being put into effect that aims not only at preventing loss of soil by deflation from the more level interior parts of the steppe plateaus by planting innumerable shelter belts of

trees, but also at checking deterioration of the margins by stabilizing side slopes and preventing further headward erosion of ravines. Methods employed include extensive tree-planting, bulldozing of the scarped and slumping ravine-side slopes to gentler declivities, the conservation of the surface by improved methods of tillage, and the building of innumerable small dams to regulate the run-off and thus prevent floods. This plan is described by Tricart as an experiment that "aims at totally transforming the erosion system." C. A. C.

ZOOLOGICAL SOCIETY EXPEDITION

A new type of expedition returned to this country just before Christmas, after ten weeks' field work in Sierra Leone. This is the expedition to West Africa organized by the Zoological Society of London in collaboration with the British Broadcasting Corporation to obtain specimens for the Society's collection at Regent's Park, to conduct biological research, and to make cinematograph films and sound recordings for broadcasting in the B.B.C's. television service. The expedition was led by Mr. J. Lester, the Society's Curator of Reptiles, who was accompanied by Head Keeper Woods, Mr. D. Attenborough (B.B.C.) and Mr. C. Lagus (Cameraman). A base camp was established at Njala near Mano towards the centre of the lowlands bush country, and journeys to other parts of the territory in search of special desiderata were made from it. A large and valuable collection of animals was safely brought to London, including a number of species that have never been seen in captivity before, and a long footage of film and sound records was obtained. These not only cover the general activities of the expedition and numerous subjects of great zoological interest, but include subjects of considerable anthropological importance. Festivities and dances performed in connection with the initiation ceremonies of the secret societies that play so large a part in the lives of the pagan natives were filmed, and numerous sound records were made of the music and songs that accompany them. The success of the expedition leads to the hope that further ventures of a similar nature may be organized to other parts of the world in the future.

EXPEDITION TO ALSTEN, NORTH NORWAY, 1953

Five members of University College, Durham, went on the expedition to the island of Alsten in the summer of 1953: B. W. Pace (leader), D. M. Moore (botanist and quartermaster), D. Nash (zoologist and treasurer), M. J. W. Lofting and B. K. Welch (geologists). The report, which may be seen in the Society's Library, contains a general survey by the leader of the organization and equipment of the expedition, the programme proposed and the terrain covered; and geological, botanical and zoological reports by the members. It is amply illustrated by photographs and diagrams, and contains a reconnaissance geological map of south-west Alsten on a scale of approximately 1 : 2000, reduced from the expedition's field sheets. A grant towards the cost of the expedition was made by the University Exploration Society and considerable assistance was afforded by the Norske Polarinstitutt and Norske Geologiske Undersøkelske. Permission to carry out the work was readily given by the Norwegian Government, and acknowledgment is made in the Expedition's report to firms who contributed food and materials.

HIMALAYAN SNOW SURVEY

A Report by R. D. Dhir and H. Singh published by the Government of India, dated 1951, "On Feasibility of Snow Survey in the Himalayas," begins by stating that though the Himalaya by reason of their geographical position are not so favourable to the accumulation of snow as many lower ranges in higher latitudes this was thought to be sufficient, because of the great altitude of the range, to justify a snow survey for economic purposes. Most of the snowfall of the Himalaya is brought by the winter depressions from the Mediterranean, that brought by the South-West Monsoon, though heavy, being relegated to the higher levels above the permanent

snow-line. The very heavy discharge of water by the Indian rivers rising in the Himalaya is almost entirely due to the monsoon rains between June and October. Some of the excess of water is stored in reservoirs on the rivers, which are full at the end of the monsoon but very low just before it commences after the hot dry season, March to May or June, when the snow is melting in the mountains. It was thought that a snow survey early in the snow melting season would enable a forecast to be made of the likely discharge into the rivers from snow which might be useful for the regulation of the reservoirs during the low stage. Accordingly snow surveyors were despatched to nine catchment basins representing different sections of the Himalaya in the seasons of 1947, 1948 and 1949 for the measurement of snow-depths, evaporation and run-off. They had to undertake long and arduous journeys in order to reach the inner ranges, accompanied by many coolies for the transport of food and equipment. Their measurements in the field had subsequently to be studied in the light of normal meteorological conditions prevailing in the Himalaya. Although meteorological observations in the mountain regions are scanty they appeared to be corroborated by theoretical deductions concerning the normal decrease of temperature and precipitation with altitude.

The bulk of the Report based upon these data is occupied with computation tables for each of the nine catchments. These indicate that the contribution from snow-melt on the Gandak, Kosi and Tista catchments is negligible, while in the remainder it varies from 9 to 26 per cent. of the total run-off, the latter figure appertaining only to the Sutlej catchment, showing how very much greater is the contribution even here from rain. The Indus and Brahmaputra were not surveyed as being trans-Himalayan rivers.

The results of the survey, though important from a theoretical standpoint, are thus economically disappointing and the Report concludes with the following words: "On the whole, in view of the very limited contribution of snow to run-off, and of the very heavy costs involved, the forecasting of the river run-off during the snow-melt season by snow survey in the Himalaya is not considered to be a useful or feasible proposition." L. C. W. B.

LAKE SOUNDING RECORDS

In the *Geographical Journal* for June (**119** (1953) 247) it was suggested that those undertaking soundings of lakes and tarns in the British Isles. who did not intend to publish their results, should send copies to the Map Room of the Society, where they would be available for reference. Maps have now been received of six tarns in Westmorland (Red Tarn, School Knot Tarn, Stickle Tarn, Grisedale Tarn, Blind Tarn, and Goats Water) from Windermere Grammar School; of Loch Avon and Loch Einich in the Cairngorms from King's College, Taunton; and of Llyn Bochlwyd in Caernarvonshire from the 5th Cambridge Senior Scouts. The Map Curator will be pleased to receive copies of other unpublished surveys.

A REGIONAL GEOLOGICAL MAP FOR ASIA AND THE FAR EAST

Under the auspices of ECAFE (Economic Commission for Asia and the Far East), the International Geological Congress and the Cartographic Office of the United Nations, an *ad hoc* Working Party met in Bangkok from 1 November to 6 November 1954 to consider preparation of a regional geological map for Asia and the Far East. The meetings were attended by representatives from Australia, Burma, China, France, India, Indonesia, Japan, Korea, Malaya, British Borneo, the Philippines, Thailand, U.S.S.R. and the U.S.A. The President of the Commission for the Geological Map of the World (International Geological Congress) also attended.

Information gathered by the ECAFE secretariat and the reports of delegates yielded a good deal of information concerning the present status of geological mapping in Asia. The delegation of the U.S.S.R. gave a detailed statement of the progress of geological survey and mapping in that country and informed the conference that a

new edition of the geological map of the Soviet Union, on a scale of 1/250,000, would be published shortly, and the remaining 79 of the 179 sheets of the 1/1 Million map would be ready by 1960. The Philippine delegation stated that a geological map of their country had been presented at the meeting of the Pacific Science Congress in 1953. Ceylon reported that there was every reason to hope that the geological survey of the country on a scale of one inch to a mile would be completed at an early date; about one-third of Ceylon had already been mapped on this scale. India informed the meeting that the geological map of India, Pakistan and Burma, published in 1933 on a scale of 1/2 Million, will have been brought up to date by the end of 1954. Between one-third and one-half of Burma has been surveyed on a scale of one inch to one mile, and this work should be completed within the next few years. A geological map of Japan was published in 1953, the scale being 1/3 Million; sheet maps on a scale of 1/500,000 are under preparation. The most recent geological map of Malaya (twelve miles to one inch) was published in 1948. For Indonesia, maps on a scale of 1/1 Million are available for most of Sumatra, Java, West Borneo and New Guinea. The second edition of the 1/2 Million geological map of Indo-China was published in 1952. A geological map of the British Territories in Borneo is being prepared (scale 1/1 Million). In Thailand, a provisional geological map of the country was published in 1950. The scale used was 1/2,500,000.

The Working Party agreed that an attempt could be made to prepare a regional geological map on a scale of 1/2 Million. This could easily be transferred later to a 1/5 Million scale to conform with other important international maps. An index map on each sheet should show the reliability of the information contained in that sheet.

As far as possible major tectonic features should be shown on the geological map and that the standard scale of stratigraphic divisions adopted by the International Geological Congress should be followed as far as possible, and precise age determination made.

Two proposals were considered concerning a suitable projection for the regional map. One was for a Lambert Conformal Conical Projection, a study of the advantages of this projection having been prepared by the Institut Géographique Nationale de France at the request of the President of the Commission for the World Geological Map. The delegation of the U.S.S.R. presented the case for an Oblique Azimuthal Equidistant projection. The coordinator in charge of the preparation of the map is to make a decision on the final projection to be adopted, after receiving comments from the countries concerned. It was agreed that the base map should show, in neutral colour, all railways, main highways, cities and major towns, navigable canals, lakes, etc. Bathymetric contours should also be indicated. The topographical maps would have to be made by the countries concerned after a decision on the projection to be used. All countries of the ECAFE region should be included in the map, in so far as information is made available.

It was agreed to print 4000 copies of the regional map for Asia and the Far East. The work is to be coordinated by the Director of the Geological Survey of India. Senior geologists of the ECAFE region were to attend the Regional Cartographic Conference convened by the United Nations in India in February 1955, when discussions will be held on geodesy, topographic mapping, hydrography, aeronautical charts, and topographical maps. The next meeting of the Working Party of Senior Geologists preparing the Regional Geological Map for Asia and the Far East will be held in November 1955, possibly in Tokyo. J. S. G.

THE MURDER OF LIEUTENANT BOYD ALEXANDER

Boyd Alexander, African explorer and naturalist, was murdered in the Tibesti country of West Central Africa in 1910; an obituary, written by Sir Harry Johnston, appeared in the *Journal* for July 1910 (Vol. 36, pp. 108–110). The murder was investigated by the French authorities and the scanty details obtained were published

in the *Journal* (see Vol. 36, pp. 226, 498). We have received the following note from General E. Husson, late of the French Colonial Army and now living at Toulon, which throws light on the hitherto mysterious circumstances of Alexander's death. General Husson writes as follows:—

"In 1909 Boyd Alexander left Lake Chad, marching eastwards with the idea of reaching the Upper Nile by traversing and exploring Wadai and Darfur. The French authorities of the Chad begged him not to enter these regions, which were populated by warlike tribes of fanatical Mohammedans, intensely hostile to foreigners and largely unsubdued, over which the French Government was able to exercise little or no control. The circumstances of Alexander's death were not known at the time, beyond the fact that he was murdered on 2 April 1910 near Nyeri, capital of Tamah, a district to the north-east of Wadai; Nyeri is about 100 kilometres north-east of Abeshr, the capital of Wadai.

"In 1929, I was a major in the French Colonial Army, stationed at Abeshr as civil and military commander of Wadai District, Chad Colony. Since Tamah then formed part of Wadai, it was also within my jurisdiction, and my tours of inspection took me from time to time into this region. At that time the chief of the Tamians was Sultan Mahamat-Tamah. When I had known the Sultan for several months, and had gained his confidence, he led me to the exact place where Boyd Alexander was murdered and showed me the tree at the foot of which the traveller had died, near the settlement of Nyeri. In Boyd Alexander's time, Nyeri was the capital of Tamah but by 1929 it was no longer so, and had fallen into ruins—those of the former palace of the Sultans of Tamah being quite impressive.

"Sultan Mahamat first explained to me that at the time of which we were speaking the country of Tamah was ruled by its own chiefs, who, for centuries past, had been the vassals, turn and turn about, of the Sultan of Wadai at Abeshr and the Sultan of Fori at Tendelty. The Sultan of Tamah was constantly trying to escape from this vassalage, with the result that the Tamians were forever invading and pillaging the Wadaians, and the Wadaians as frequently retaliated. Naturally, the most intense enmity existed between the tribes in consequence of these raids. To make matters worse, the population of Tamah is quite different from that of Wadai. The latter is almost entirely indigenous, at least since about the sixteenth century, while the Tamians are recent immigrants from the equatorial regions to the south. As a result, any stranger coming into Tamah from Wadai was highly suspect both to the chief and the people of that country; this was the case with Boyd Alexander who, before arriving at Nyeri, had stayed for a time at Abeshr under the protection of the Sultan of Wadai.

"During his travels Boyd Alexander made a detailed study of the fauna and flora of the countries he visited, and this was what he planned to do in Tamah. In particular, near Nyeri there was a steep wooded hill which offered a wealth of plants and animals for his study. He was therefore determined to investigate this hill, known then as now as "Mont Tamah." There are many springs on Mont Tamah; it is heavily wooded and difficult to climb, the paths being narrow and rock-strewn. It is a feature in a massif of some importance.

"The Sultan explained that Mont Tamah was a sacred hill, held in reverence by the local people. It had always been their refuge in time of war, and they had built there a whole system of defensive fortifications, surrounding and protecting the strong point near the summit to which the sultan and his family fled in time of trouble. To penetrate to this fastness was absolutely forbidden.

"By doing so Boyd Alexander, unconsciously, was guilty of a crime which drew down on him the wrath of the men of Tamah. This, according to Sultan Mahamat-Tamah, was what led to the plot against the traveller's life. On the night of 2 April 1910, Boyd Alexander was stabbed in the obscurity of his tent. He was not killed outright, and coming out the better to defend himself he leant his back against a nearby tree (to which the Sultan pointed as he spoke), and died there before he could be attacked again.

"This was the story told to me on the spot by Sultan Mahamat-Tamah. But at other times he added some further details which I have not been able to confirm. The Sultan of Wadai, he explained, was surrounded by a circle of native chiefs, of feudal lords as it were, one of whom, the Aguid es-Sabah, was specially charged with relations in peace and war with Tamah. The Sultan had therefore directed this official to keep an eye on Boyd Alexander from the moment he left Abechi for Tamah. Travellers passing through or sojourning in Abeshr were habitually refused leave to enter adjoining territories, the more so when the traveller was a foreigner and so more likely to be a spy in the service of some neighbouring chief. Knowing that the French authorities in the Chad had tried to persuade Boyd Alexander not to visit Wadai and the lands to the east, the Sultan had used this as a pretext to detain him, and to prevent him from leaving for Tamah, with which land he was on bad terms. Not being able to hold the Englishman by force, he gave the Aguid es-Sabah orders not to let him go to Tamah even if it meant killing him. The Aguid's men had not been able to catch up with Alexander before he arrived at Niery, and my informant suggested that they had there appealed to the hostile feelings of the Tamians towards the foreigner, and had incited them to assassinate him. This elaboration of the original story was perhaps told me in order to excuse the part played by the Sultan Mahamat-Tamah, and to minimize the blame attaching to the Tamians."

MALAYAN JOURNAL OF TROPICAL GEOGRAPHY

The Department of Geography in the University of Malaya is to be commended for its enterprise in undertaking the publication of the *Malayan Journal of Tropical Geography*, the first four single-number volumes of which have now appeared. The first three of them are devoted to papers and notes on various aspects of the geography of tropical regions, while the fourth is a monograph by Mr. Ooi Jin-Bee on "Mining Landscapes in Kinta." In all the volumes there are good illustrative maps, though some of them fail to show place-names which appear in the accompanying text. Each volume contains between fifty and seventy large pages, is well produced in a pleasant format, and costs 8*s* 6*d*; the subscription for the issues of one year is 16*s*. The Editor is Mr. Paul Wheatley, and it does not diminish the quality of his work to say that it is clear that Professor E. H. G. Dobby's inspiration lies behind the whole project. A journal specifically dedicated to the geography of the tropics is to be welcomed not only because of the intrinsic interest and importance of tropical regions, but also because it is only by comparative study of different parts of the tropics that valid generalizations will emerge about the various aspects of tropical geography. Seven of the fifteen papers in the first three volumes concern extra-Malayan areas, so that the *Journal* is beginning to make its contribution to comparative studies. One could wish, nevertheless, for slightly less emphasis on Malaya and for more studies covering some single aspect or problem in two or more tropical regions. It is to be hoped, too, that something will be done in future issues to achieve a better balance of interest. Of the fifteen papers so far, the distribution between subjects is as follows: climatology, 1; vegetation, 1; soils, 1; population (qualitative), 1; irrigation and agriculture, 7; settlement, 1; historical, 2; regional study, 1. There are thus only three on purely physical aspects, and none at all on the fascinating and fundamental subject of tropical geomorphology (for which, incidentally, Mr. Wheatley enters a plea in one of his contributions). Soil, too, is certainly under-represented in view of its transcendent importance, especially as the single paper on it (by Professor F. Hardy of the Imperial College of Tropical Agriculture, Trinidad) is little more than a series of notes. One also hopes that future numbers will tell us something of social geography, and of the quantitative aspects of population in the tropics. More weight on synthesized regional studies would also be welcome, though Mr. Ooi's monograph does something to redress the balance in the right direction; for although he does not claim that his study is a regional monograph, he does examine a whole group of factors which affect mining and the mining landscape and thus spans most of the considera-

tions which would enter into a regional synthesis. The two historical papers, one by Mr. Wheatley on "Takla Emporion . . . an Early Malayan Place-Name," the other by Mr. G. R. Tibbetts on "Early Western Cartography and the Arabian Peninsula," are to be welcomed; for they may well herald a geographical refreshment of the arid regions of oriental scholarship. Mr. Wheatley has, however, caught from the Orientalists the habit of grossly overloading his text with footnotes. The large number of papers on agriculture is all to the good, though perhaps a little out of proportion. The best is Mr. G. J. A. Terra's, on "Mixed Garden Cultivation in Java," if only because it gives due weight to the nature of indigenous society. The new journal contains much that will interest the geographer; and, if it goes on as it is going, and if it makes some attempt to adjust the balance of its contents, it is certainly to be commended to every geographical library that prides itself on being in the least comprehensive. B. H. F.

GEOGRAPHICAL SERIALS FROM BULGARIA AND HUNGARY

After a fourteen-year interval, the Bulgarian Geographical Society, Sofia, has now published volume XI of the Society's *Izvestiya* (Bulletin), in celebration of the 50th anniversary of the Geographical Institute of the University of Sofia and the 30th anniversary of the Bulgarian Geographical Society. The volume contains 316 pages, with sketch-maps and illustrations and was published in an edition of 1000 copies. The four main papers are concerned with the physical geography of the Kazanlik valley, the Bulgarian coast of the Black Sea, the economic geography of the Vratza area and with political and ideological instruction in the teaching of geography. Each paper has a summary in Russian and in French, and the volume contains a list of some 800 books and papers on the geography of Bulgaria published between 1942 and 1948.

The Bulletin of the Hungarian Geographical Society, Budapest (*Földrajzi közlemenyek*), has recommenced publication after a five-year interval with volume 77 (1953). The *Bulletin* is now to be published quarterly, with abstracts in Russian, English, French and German, of most papers. The pre-war 'International edition' is not yet being republished.

The Society's Library holds almost complete sets of both these serials, the Bulgarian *Izvestiya* from vol. 1 (1933) and the Hungarian Bulletin from vol. 1 (1873).

SOVIET GEOGRAPHICAL SERIALS IN THE SOCIETY'S LIBRARY

BULLETIN (IZVESTIA) OF THE ACADEMY OF SCIENCES OF THE U.S.S.R.: GEOGRAPHICAL SERIES 1954. No. 5 (September–October). New Soviet research and discoveries in the central Arctic. Some laws of geographical zonality: by A. A. Grigoriev. The influence of cultivation of the soil on drainage: by M. I. Lvovich. Karst in the Kuibishev basin: by A. V. Stupishin. The assymmetry of river valleys: by V. V. Batyr and B. V. Selivanovskii. New findings regarding the ancient coastline on the Caspian sea-bed: by V. G. Richter. Some characteristics of the structure of the Donetz coal basin: by D. M. Konenkov. Paleogeographic material from the Novopokrovsk settlement on the Amur: by V. V. Nikolskaia. On the division of territory in regions according to its physical geography: by V. I. Prokaev. Review of the Soviet 'World atlas.'

No. 6 (November–December). The natural resources of China: by V. T. Ziachikov. Geographical work in Bulgaria: by I. P. Gerasimov. The glacial period in Mongolia: by I. A. Marinov. Some laws of geographic zonality (Conclusion): by A. A. Grigoriev. Hydro-thermic indications of vegetational periods in cultivated plants: by E. A. Doroganevskii. The geography of sub-tropical agriculture in the Georgian S.S.R.: by A. A. Mintz. Micro-relief and structure suited to utilization in the Pre-Caspian peninsula: by L. L. Mozeson. Basic principles of A. N. Krasnov: by F. N. Milikov. First exploration of the Baikal: by M. I. Pomus.

BULLETIN (IZVESTIA) OF THE ALL-UNION GEOGRAPHICAL SOCIETY, Leningrad. Vol. 86 (1954) No. 5 (September–October). Natural zones: by P. S. Makeev. Characteristics of continental climate: by L. G. Polozova. A geographer's impressions of a journey in Poland: by S. V. Kalesnik. The tasks of economic geography: by D. S. Timoshkin and others. Some problems of the geography curriculum in "intermediate" schools: by A. D. Gozhev. Causes of neglect of formerly irrigated areas in the Kunya Darya: by B. V. Andrianov. Traces of ancient cultures in the caves of the Tian Shan: by A. P. Okladnikov and V. I. T. Ratzek. Some peculiarities in valley forms in Western Podolia: by A. D. Kucheruk. Russian geographical names in the Antarctic: by V. O. Guretskii.

No. 6 (November–December): Geography in the Peoples Republic of Poland: by S. Leszczycki. Territorial expansion of Siberian agriculture to the Pacific Ocean in the 18th century: by G. F. Safranov. Methodological basis of economic geography: by M. S. Buyanovskii. Climatic regions of Tuva: by V. S. Antonov. Climatic factors in the southern European part of the U.S.S.R.: by G. S. Zhegnevskaia. Teaching general physical geography in schools: by P. G. Kocherkin. Report on the All-Union Geographical Society for 1953. Awards of medals and prizes of the All-Union Geographical Society, 1952.

NOTES

The Brazilian National Committee of the International Geographical Union has sent to the Society an advance copy of the programme for the 18th INTERNATIONAL GEOGRAPHICAL CONGRESS to be held in Rio de Janeiro from 9–18 August 1956. This "First Circular," dated December 1954, will be generally circulated later; in the meantime, it may be consulted in the Library. It contains the Conference Agenda, the rules for submission of papers and details of excursions.

* * *

A useful discussion of the boundaries of Canada—international, provincial and territorial—by N. L. Nicholson has recently been published by the DEPARTMENT OF MINES AND TECHNICAL SURVEYS, CANADA (Geogr. Branch, Mem. 2, price 75 cents). The stages in the development of the boundaries are succinctly summarized, and reasons for their geographical location and their relation to modern regionalism discussed. There is an extensive bibliography and numerous sketch-maps.

* * *

The South Pacific Commission has published a BIBLIOGRAPHY OF BIBLIOGRAPHIES OF THE SOUTH PACIFIC compiled by Miss Ida Leeson, formerly Mitchell Librarian (Geoffrey Cumberlege, 15*s*). The entries, clearly set out, are arranged first regionally and then by subject, and there is an index in dictionary form.

* * *

The Conservation Foundation and the Food and Agriculture Organization of the United Nations have issued a SOIL EROSION SURVEY OF LATIN AMERICA, consisting of articles reprinted from the July, September and November 1954 issues of the *Journal of Soil and Water Conservation*. Part I deals with Middle America (including the West Indies), Part II with South America proper, and Part III is entitled "Agents of Soil Erosion." The three maps in colour are described as representing "the first real assessment of the degree to which erosion has ravaged Latin American soils."

* * *

With the first number for 1955, GEOGRAPHY appears in an improved form, the style and lay-out having been completely re-designed. The larger and pleasanter type and the new cover are particularly attractive. The contents include a thoughtful paper by R. W. Steel on "Land and population in British Tropical Africa," and further contributions to a recently introduced and useful feature, "This changing world," edited by Mr. L. S. Suggate, this year's President of the Geographical Association.

* * *

The ANNUAL VISUAL AIDS CONFERENCE is to be held this year at Bedford College, Regent's Park, London, on July 8 and 9, under the auspices of the National Committee for Visual Aids in Education and the Educational Foundation for Visual Aids. Enquiries should be addressed to The Secretary, N.C.V.A.E., 33, Queen Anne Street, W.1. There is no conference fee and all who are interested will be welcome.

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A Summer School in English Historical Geography is being organized by the UNIVERSITY COLLEGE OF LEICESTER from August 3–13 this year. The full programme may be obtained from J. D. Gould, Department of Adult Education, University College, Leicester.

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OBITUARY

GEORGE WALTER GRABHAM

1882–1955

G. W. Grabham, O.B.E., F.R.S.E., died at Khartoum on January 29: he was born in Madeira in 1882. Educated at University College School and St. John's College, Cambridge, he served on the Geological Survey in Scotland from 1903 to 1906, when he became Government Geologist to the Anglo-Egyptian Sudan. Retired automatically in 1934, he remained as Geological Adviser till 1939. During the war he was in Madeira, where he had his home, and later he wintered in the Sudan.

He contributed to the reconstruction of the Sudan from the early years of the century by his development of water supplies and his advisory work on the siting of major irrigation installations. He was one of the pioneers of the use of motor transport in the Sudan and travelled extensively there and in Africa throughout his career; he was responsible in a self-effacing way for some notable journeys. He and R. F. Black carried out the Lake Tana Mission in 1920–1. Among his numerous responsibilities was that of Acting Conservator of Antiquities, and he was keenly interested in the establishment and maintenance of various museums. His geographical contributions lay also in his encyclopaedic knowledge of the Sudan and his generosity in communicating it to others, though he published comparatively little. He was perpetually "at home" to those who passed through Khartoum, where his hospitality and evening discourses were a part of its life. To travel with him was an experience. He became a legend within his own lifetime, esteemed by all categories of the population.

He occupied a similar position in the community of Madeira, where his father, Dr. Michael Grabham, had lived before him. Here again scientists and geographers profited by his penetrating knowledge of problems which they had come to study. Professor Hans Pettersson was entertained by Grabham when the *Albatross* put into Funchal in 1947, and has included a charming description of the occasion in 'Westward Ho! with the *Albatross*.' Pettersson and his colleagues admired the tulip tree, planted by Captain Cook, which grew in Walter Grabham's garden, and were presented with a bottle of old Madeira which had been round the world in the *Challenger*.

Grabham had a fund of kindness and sense of humour which, to his pleasure, some failed to detect; and the anecdotes resulting therefrom, if they could be preserved, would form a graceful tribute to a man who achieved fame in spite of himself.

K. S. S.

GEORGE MARTIN LEES

1898–1955

By the death of George Martin Lees at the early age of fifty-six, British geology has lost one of its outstanding personalities. A born leader and great gentleman, his genial but stimulating presence will be sadly missed by many friends in many countries. Educated at St. Andrew's College, Dublin, after passing through R.M.A. Woolwich Lees was commissioned at the early age of seventeen in the First World War, went to France with the R.A. and won the M.C. He then transferred to the R.F.C., being awarded the D.F.C. for service in Mesopotamia. After the war he joined the Civil Administration in Iraq, under Sir Arnold Wilson, and it was when serving as Assistant Political Officer in Kurdistan that his interest in geology was first aroused by the mountains, which here as elsewhere in the Zagros Ranges, display their structure and constitution in almost elemental nakedness. After an exciting escape from Kurdistan at the time of the insurrections (he wrote the story in the Central Asian Society Journal shortly afterwards), he returned home and joined the Anglo-Persian in 1921

as assistant geologist, taking courses at The Royal School of Mines (where his infrequent appearance at lectures was more than counterbalanced by an ability to work six times harder than normal). Then followed a series of geological surveys in the Middle East, in various parts from Suez to Oman. During much of this time he profited by working with Professor H. de Bockh, geological adviser to A.P.O.C., a Hungarian of inspiring personality and character, with a great knowledge of East Alpine geology. Lees then went to the University of Vienna for a year, where he was awarded a doctorate of philosophy for a thesis on the geology of Oman. After further surveys in many lands he was appointed Chief Geologist of Anglo-Persian Oil Company in 1930 at the age of thirty-two, and under his direction during the next twenty years more oil was discovered by fewer wells than the world had yet seen, and over 100,000 square miles of mountainous and hilly country was geologically mapped on appropriate scales. In 1933 he initiated a new attack on the problem of oil in England (an earlier Government-inspired effort after the First World War had failed) resulting in the discovery of the East Midland Oilfields in 1939. During the Second World War he was seconded for a period to the Petroleum Division of the Ministry of Fuel and Power. In 1943 he was awarded the Bigsby Medal by the Geological Society, largely because of the stimulus his oil search was giving to British geology by the great advances in sub-surface knowledge. In 1948 he was elected a Fellow of the Royal Society and from 1951 to 1953 he was President of the Geological Society. He was a member of the Geological Survey Board and the Colonial Survey Board. In 1954 he was the first British recipient of the Sidney Powers Memorial Medal, the highest award of the American Association of Petroleum Geologists. In all his writings and speeches Lees showed a clarity of expression which was outstanding. He had a prodigious memory for the facts of world geology, assisted by years of travel and careful listening (he probably learned as much from the spoken word as from the written). With his great capacity and ability went a genuine modesty; he was also the most accessible of men, always ready to help, and served as a J.P. in recent years in spite of a heavy burden of other work. His many friends will like to think of him striding bareheaded over the Middle Eastern hills or dominating a meeting by pungent but genial criticisms.

N. L. F.

CORRESPONDENCE

Hydrology and Soil Science

In the issue of the *Journal* for March 1954, two contributors referred to soil science and suggested that it might help in problems having a geographical nexus and agricultural content. All agriculture depends on utilization of water and on adaptation of its natural motions. As an agricultural chemist, I firmly believe that geography is an important member of the complex of sciences which pass under the name "agricultural chemistry."

Mr. H. W. Underhill has done well to indicate the importance of hydrology (*Geogr. J.* **120** (1954) 385–7) and to state that the "failure of many important projects has been due to lack of hydrological information." Hydrology needs to be more than an appanage of civil engineering, since if it were only that, the tendency might be to regard water as a mere fluid, of which the composition has little or no interest, except perhaps if the water is saline and intrusive.

The degree of salinity of natural waters is of high interest in many spheres of endeavour, including agriculture; salinity depends on climate and geography among other things. It is true that the U.N.E.S.C.O. Arid Zone Programme is very much concerned with hydrology; the Programme is also much concerned with the salinity

of the waters (and soils) within its purview. A hydrologist should be something more than a civil engineer with a differential training, but fortunately there is no need for him to know much about chemical analysis in addition to the sciences listed by Mr. Underhill. It is probable that from a judicious combination of *p*H and electrical conductivity a hydrologist can obtain all the physico-chemical and plant-ecological indications he requires in the first instance about any water, providing that he is fully informed about the kinds of information extractable from those two determinations—which lend themselves readily to being made in the field.

This, I think, is the kind of knowledge based on soil science that needs to be joined to the fluid mechanics of water so as to obtain what Mr. Underhill wisely called an appreciation of the balances existing between forces in nature, and the complex relationships between natural phenomena.

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15 *November* 1954

REGIONAL PLANNING IN THE UNION OF SOUTH AFRICA

N. C. P.'s notes on "Recent Developments in Regional Planning in the Union of South Africa" in the September 1954 issue of the *Journal* call for comment.

(1) *Regional Planning Bodies.*—No mention is made of the Report No. 9 on Regional and Town Planning (1944) by the now defunct Social and Economic Planning Council which led to the establishment of the Natural Resources Development Council in 1947 (not 1937). This was the first official step taken towards regional planning in the Union. In this respect, however, the Council's powers are restricted to "Controlled Areas," only two of which have so far been established, viz. the gold mining and adjacent areas of the N.W. Orange Free State and the S.W. Transvaal. In regard to the "collecting of information" and regional research the Council is not so restricted—to which its various published reports, notably the Vaal River report, bear testimony.

No reference is made to the Provincial Town and Regional Planning Commission, a statutory body (not an "association") established in 1951. Though it has completed a preliminary survey of the Tugela Basin it was not set up specifically to safeguard the development of that Basin. It is misleading to say that "very little has been done to carry out a really comprehensive survey of any region in South Africa, particularly the Native Areas" when the Commission for the Socio-economic Development of the Native Areas, appointed in 1951, has recently completed its voluminous, though as yet unpublished, report. The Reference and Planning committees of the Land Tenure Advisory Board, established in terms of the Group Areas Act, 1950, are also not mentioned. Their function is the coordination of proposals for racial zoning of towns and cities and their surrounding areas. On the other hand, the Industrial Development Corporation which N. C. P. rightly describes as a body " to assist new industrial ventures" (financially) is, however, not a regional planning body.

Many governmental bodies are involved in regional planning in South Africa today and the Natural Resources Development Council is linked with many of them by direct representation, through consultation or by integration in subsidiary planning committees for the S. and S.W. Transvaal and the N.W. Orange Free State. The regional development associations to which reference is made are non-official (not "semi-regional") bodies which aim at promoting the welfare of their particular regions. Its Act enjoins the Natural Resources Development Council to encourage their activities and to guide them in the promotion of regional development.

(2) *Regional Surveys.*—The first volume of the Natal Regional Survey to which N. C. P. refers concerned natural resources and was published four years ago; a further ten volumes have since appeared. The last annual report of the N.R.D.C. quoted is that for 1951. Two reports published since would have indicated that regional reports

on the Transvaal Lowveld, the Southern Transvaal, the Orange Free State and the Klerksdorp Goldfields were being or had been prepared; that the Natal Town and Regional Planning Commission was building on its preliminary Tugela Basin report by a number of detailed specialist surveys; that Rhodes University was probably embarking on a survey of the Buffalo River basin and that a committee of provincial and university personnel had been appointed to coordinate regional research in Natal. In the same category, but unmentioned, is the Economic Atlas of the Union, by Professor Talbot of Capetown University, which is being prepared for publication by the Trigonometrical Survey Office.

(3) *Maps and Statistics.*—The statement concerning "the lack of suitable topographical maps, almost complete dearth of land use, soil type and vegetation maps, scanty climatic data and inadequate statistical information about population and agriculture" is too sweeping and requires qualification. Bearing in mind the size of the country, its sparse population and the rapid development of some areas requiring immediate attention, improvement in map coverage has been rapid. Half-million (a new series) and quarter-million maps cover the whole country, while 1/50,000 maps of important areas are being steadily produced. At the request of the N.R.D.C. and of the Natal Planning Commission, detailed 1/18,000 maps have been prepared for the Witwatersrand and the Greater Durban regions, specifically for planning purposes. Aerial surveys, already covering most of the country, are being hastened by being given out to private contract. A map and memoir recognizing 70 different veld types by J. P. Acocks (Botanical Survey Memoir No. 28) on a scale of 1/1,500,000 has recently been published as have maps on the same scale depicting water resources, state forestry, agro-economic regions and population distribution. The Department of Agriculture is very likely embarking soon upon the preparation of land use maps from air photographs for farm planning purposes, a programme that will involve 4000 to 5000 farm plans each year. It is admitted, however, that specifically for soil conservation work the output of detailed maps and in certain cases suitable aerial photographs is inadequate—but this must not be confused with the broader problems of regional planning on a scale commensurate with a large, rapidly developing, youthful country. Finally, the Bureau of Census and Statistics has greatly widened the range of its agricultural data in the past five years.

Regional planning, as N. C. P. states, has come to the fore recently in South Africa though, if measured by the Tennessee Valley Authority, the beginnings are still modest. On the other hand, judged by local standards, great advances have been made and the availability of both published and unpublished data is fortunately far better than N. C. P.'s notes would suggest.

T. J. D. FAIR

Planning Officer,
Natural Resources Development Council,
Pretoria,
29 *December* 1954

MEETINGS: SESSION 1954–55

Meeting of 21 February 1955. Professor W. G. East in the Chair

Paper: Economic planning of eastern Europe. By A. A. L. Caesar

Meeting of 7 March 1955. The President in the Chair

Elections to Fellowship: Aziz Ahmad; Michel Francois Amestoy, Jr.; Malcolm Barnes; Lady Rhoda Birley; Derek A. Blundell; Adrian John Bristow; Colonel James Donald Campbell; John Lyon Chapple, B.A.; Philip Lane Clark; Reginald Stevenson

Collins, PH.D.; The Rt. Hon. Harry Frederick Comfort Crookshank, P.C., C.H., M.A.; Sir Cecil Day; Madame Marie T. U. de Schooten; Charles James Duffin; Rev. Timothy S. K. Dzao; Miss Jeanna H. Engvall, B.A.; Lawrence Alan Eyre; Rev. Richard C. Felber, Jr.; Miss Dorothy J. Jackson, B.SC.; Richard Hattil Janes; John Martin Kretschmer, B.SC., A.M.I.C.E.; Major-General Gerald William Lathbury, C.B., D.S.O., M.B.E.; Peter Anthony Lazarus; John Stuart Lucy; Robert E. S. Milne; James Morris; Francis Shearer Newton; Miss M. E. L. Parsons; Martin Martius Riley, B.A.; C. Marshall Spink; George Albert Mole Tait, B.SC., Arthur Jackson Thomasson; Miss Lilian Ratcliff Trengrouse; Wilfred George Tuck; Cyril George Umoh; Geoffrey Francis A. Ward, B.SC.; Alfred Robert Watson, B.SC.; Hugh Cecil Watson; Paul Wheatley; Sir Michael Robert Wright, K.C.M.G.

Elections to Associate Membership: John G. Esplen; Miss Jean Wallace

Paper: Sailing across Europe. By Merlin Minshall

Meeting of 14 March 1955. Mr. Leonard Brooks in the Chair

Film: Life of the Adélie Penguin. Commentary by Dr. W. J. L. Sladen

Meeting of 28 March 1955. The President in the Chair

Elections to Fellowship: Miss E. E. Austin; Roy Blewett, B.SC.; Geoffrey Bowen; Miss Elizabeth P. Bray; Clarence Edgar Brock; Rupert B. Craig; Miss Marigold Cross; Squadron Leader L. W. Davies; Mrs. Muriel Edith Dean, B.SC.; Charles E. Eather; J. Evans; Ronald Eyland; Dr. T. J. D. Fair; Miss Alice Farrell; Rev. John Garlock; James Douglas Glover; John Adrian Grant; Miss Nancy W. Hackwell; Miss Pamela M. Hayworth; Dudley Kerwood; Mrs. Rachel M. Lloyd; Angus J. D. M. McInnes; Anthony John Mansfield; Captain Edward C. Jones; Miss Pauline M. Minson, B.SC.; Michael C. A. Mott; John M. D. Mott; Thomas Osterloff; Alan Sergent; William Russell Simpson, B.COM.; Sir Terence Allen Shone, K.C.M.G. J. Sugandjavanij; Miss Eileen Mary Sugden; Miss Gladys E. Taylor; Miss Nettie Temkin; Ellis E. Turner; Geoffrey L. W. Watson; Michael E. Wayte, M.A.; Captain Alfred Wardell; Michael J. Wilson; William E. J. Wilson; Colin L. Winchester; Rev. Dr. William F Wolsey

Paper: Lake Van and Turkish Kurdistan. By Peter Davis

Meeting of 4 April 1955. Dr. E. W. H. Briault in the Chair

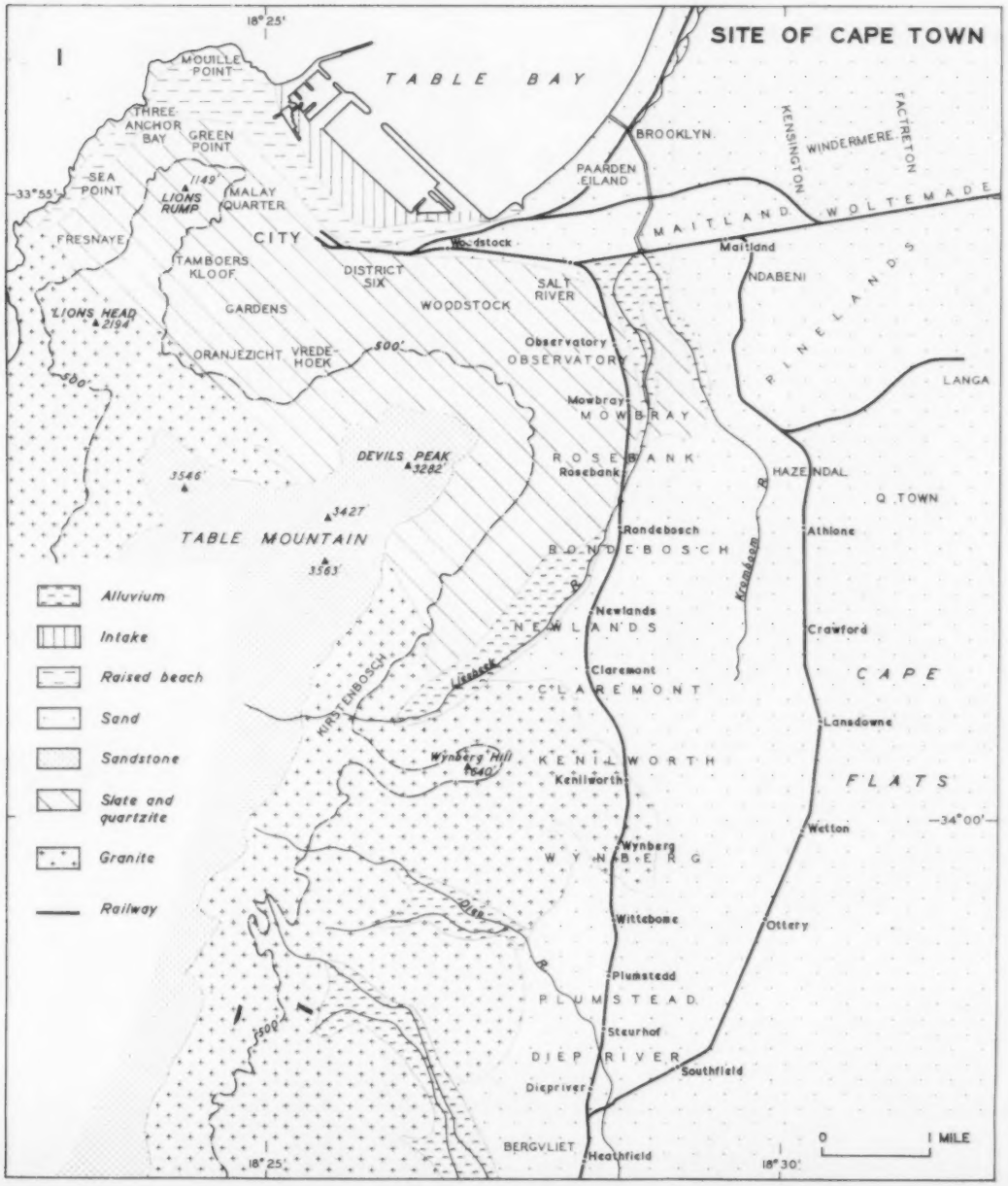
Paper: Cambridge Expedition to Ancora (North Portugal). By R. D. Hayes

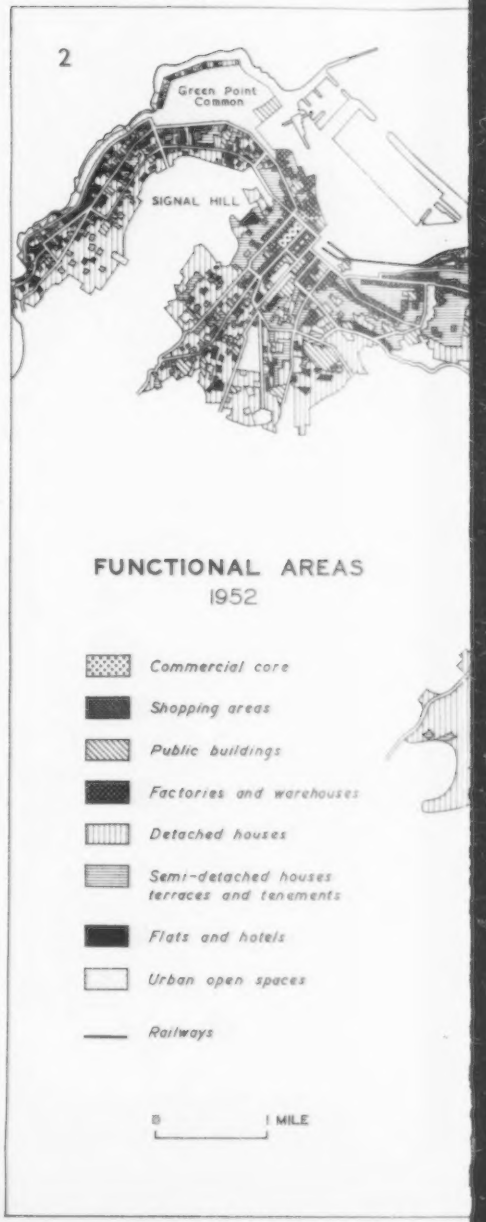
Meeting of 18 April 1955. The President in the Chair

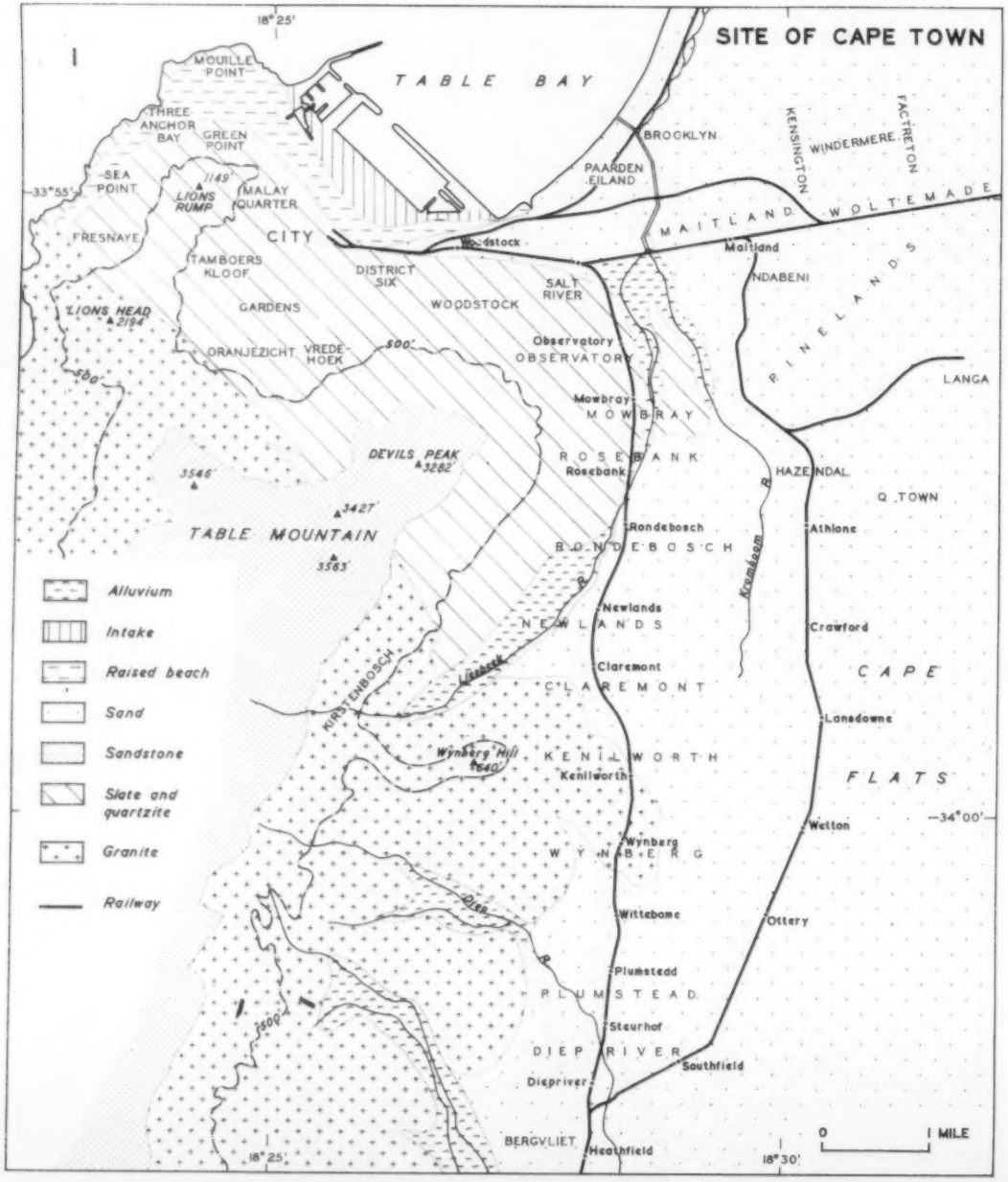
Elections to Fellowship: R. C. Alcock; Arthur C. Clipstone, B.A.; Francis A. Cook, B.A., M.SC.; Albert E. Dale; Ronald Dow, M.A.; Miss Alice Elliott; E. G. W. Ellis; Peter Fletcher; Donald Grant; Flight Lieutenant John M. Greenhow; John B. Heaney; Douglas E. Honer, B.SC.; Charles E. H. Hull; Herbert J. G. Jones; Rev. Russell Killman; Roy Kneeshaw; Louis Metcalfe; Ian Arthur Milner, A.R.I.C.S.; G. P. Pirie-Gordon; Thomas R. Richardson, B.SC.; John Franklin Thomasson; Rev. Martin F. Tupper, M.A.; Lieutenant Henry Penn Wenger; Raymond McMahon Winter

Elections to Associate Membership: Bryan Drewett; David Ross Stoddart

Paper: East Africa and her neighbours. By Dr. E. B. Worthington


SITE OF CAPE TOWN
1
18°25'
TABLE BAY
MOUILLE POINT
THREE ANCHOR BAY
GREEN POINT
SEA POINT
LIONS RUMP
1149'
MALAY QUARTER
FRESNAYE
CITY
TAMBOERS KLOOF
DISTRICT SIX
SALT RIVER
WOODSTOCK
GARDENS
LIONS HEAD 2194
ORANJEZICHT
VREDEHOEK
500'
Observatory
OBSERVATORY
Mowbray
MOWBRAY
ROSEBANK
Rosebank
DEVILS PEAK 3282
3546'
3427'
TABLE MOUNTAIN
3563'
BRONDEBOSCH
Rondebosch
Newlands
NEWLANDS
Claremont
CLAREMONT
KIRSTENBOSCH
Liesbeek
Wynberg Hill 640'
KENILWORTH
Kenilworth
WYNBERG
Wynberg
Diep R.
Wittebome
Plumstead
PLUMSTEAD
Steurhof
DIEP RIVER
Diepriver
Southfield
BERGVLIET
Heathfield
18°25'
18°30'
-33°55'
-34°00'
BROOKLYN
PAARDEN EILAND
KENSINGTON
WINDERMERE
FACTRETON
MAITLAND
WOLTEMADE
Woodstock
Maitland
NDABENI
PINELANDS
LANGA
HAZENDAL
Q TOWN
Athlone
Kromboom R.
Crawford
CAPE FLATS
Lansdowne
Wetton
Ottery
Alluvium
Intake
Raised beach
Sand
Sandstone
Slate and quartzite
Granite
Railway
0
1 MILE


2
Green Point Common
SIGNAL HILL
FUNCTIONAL AREAS
1952
Commercial core
Shopping areas
Public buildings
Factories and warehouses
Detached houses
Semi-detached houses terraces and tenements
Flats and hotels
Urban open spaces
Railways
0
1 MILE


1
SITE OF CAPE TOWN
18°25'
TABLE BAY
MOUILLE POINT
THREE ANCHOR BAY
GREEN POINT
SEA POINT
LIONS RUMP
1149'
MALAY QUARTER
CITY
FRESNAYE
TAMBOERS KLOOF
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PLUMSTEAD
Steurhof
DIEP RIVER
Diepriver
Southfield
BERGVLIET
Heathfield
18°25'
18°30'
-34°00'
BROOKLYN
PAARDEN EILAND
KENSINGTON
WINDERMERE
FACTRETON
MAITLAND
WOLTEMADE
Woodstock
Maitland
NDABENI
PINELANDS
LANGA
HAZELDAL
Q.TOWN
Athlone
Krombaam R.
Crawford
CAPE FLATS
Lansdowne
Wetton
Ottery
Alluvium
Intake
Raised beach
Sand
Sandstone
Slate and quartzite
Granite
Railway
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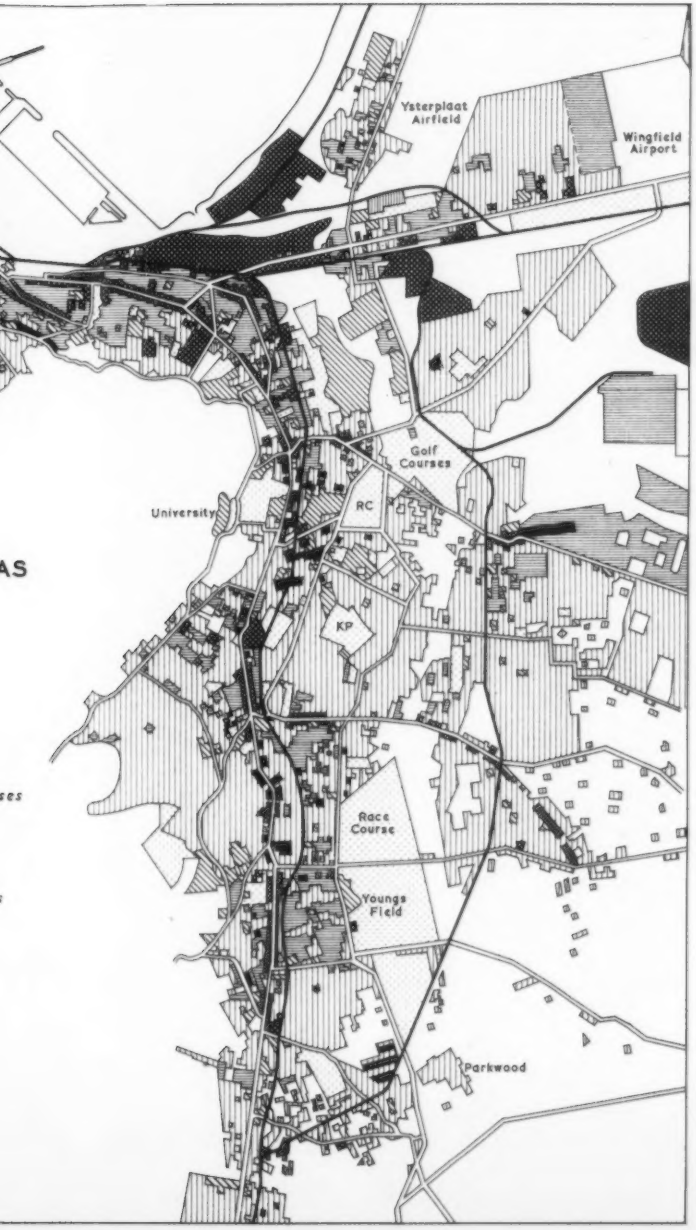
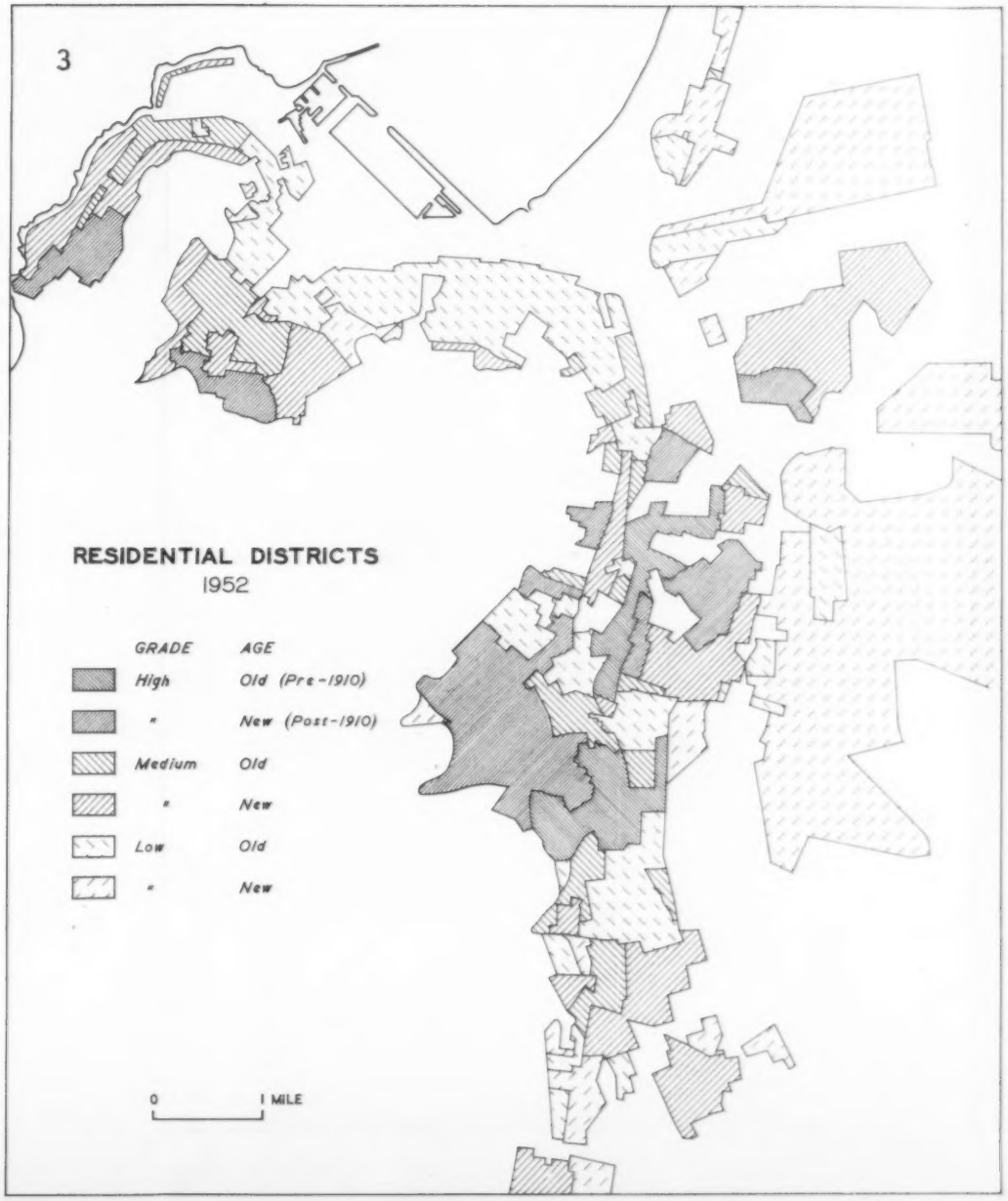
Green Point Common
SIGNAL HILL
FUNCTIONAL AREAS
1952
Commercial core
Shopping areas
Public buildings
Factories and warehouses
Detached houses
Semi-detached houses terraces and tenements
Flats and hotels
Urban open spaces
Railways
0
1 MILE

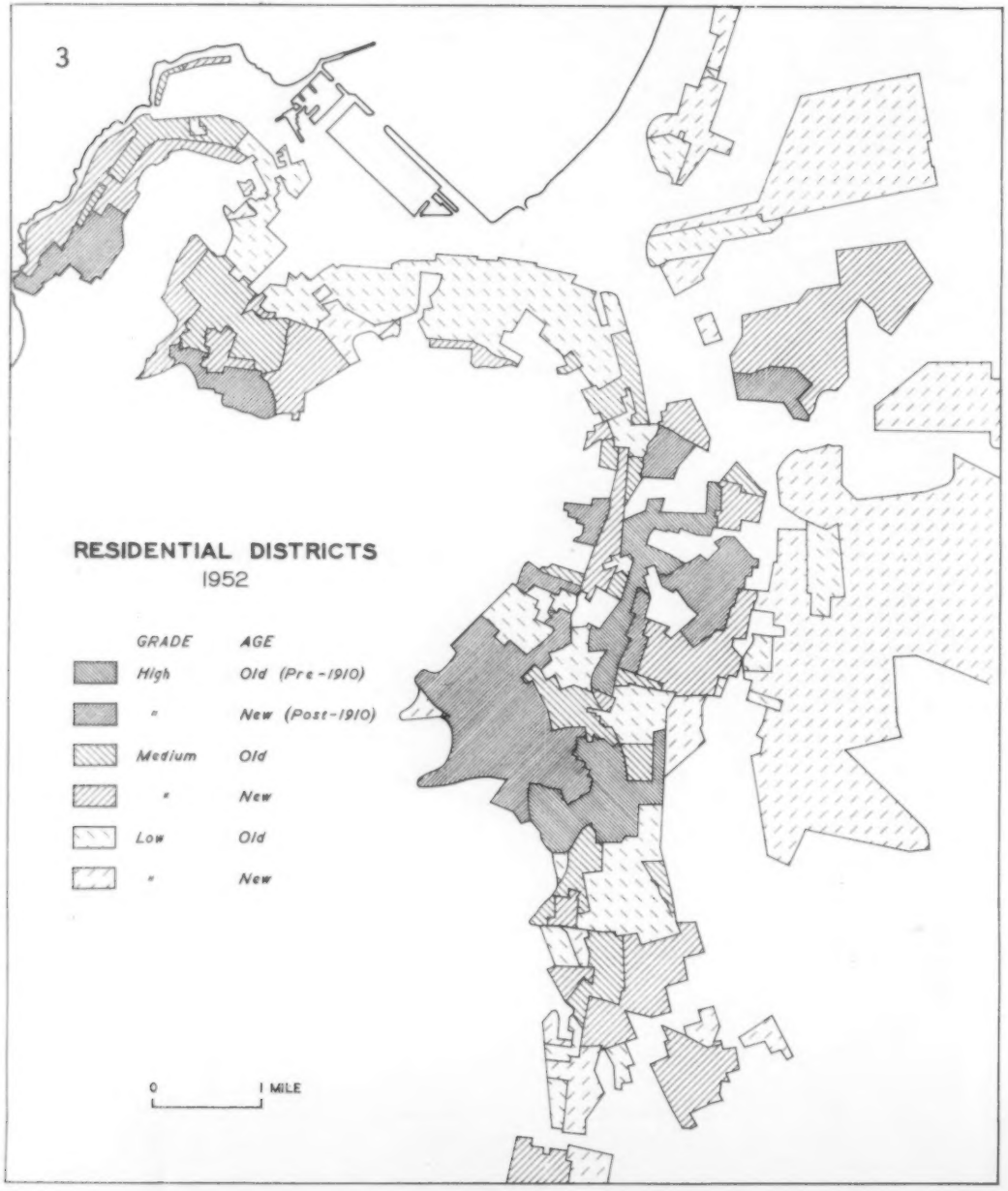
CAPE TOWN : A MULTI-RACIAL CITY





CAPE TOWN : A MULTI-RACIAL CITY

3



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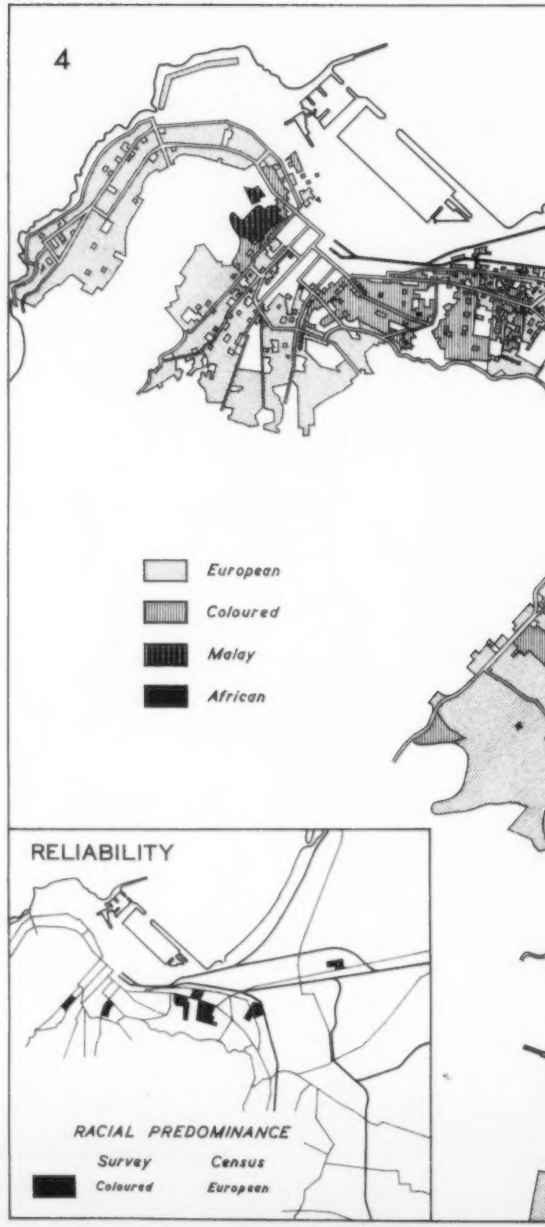
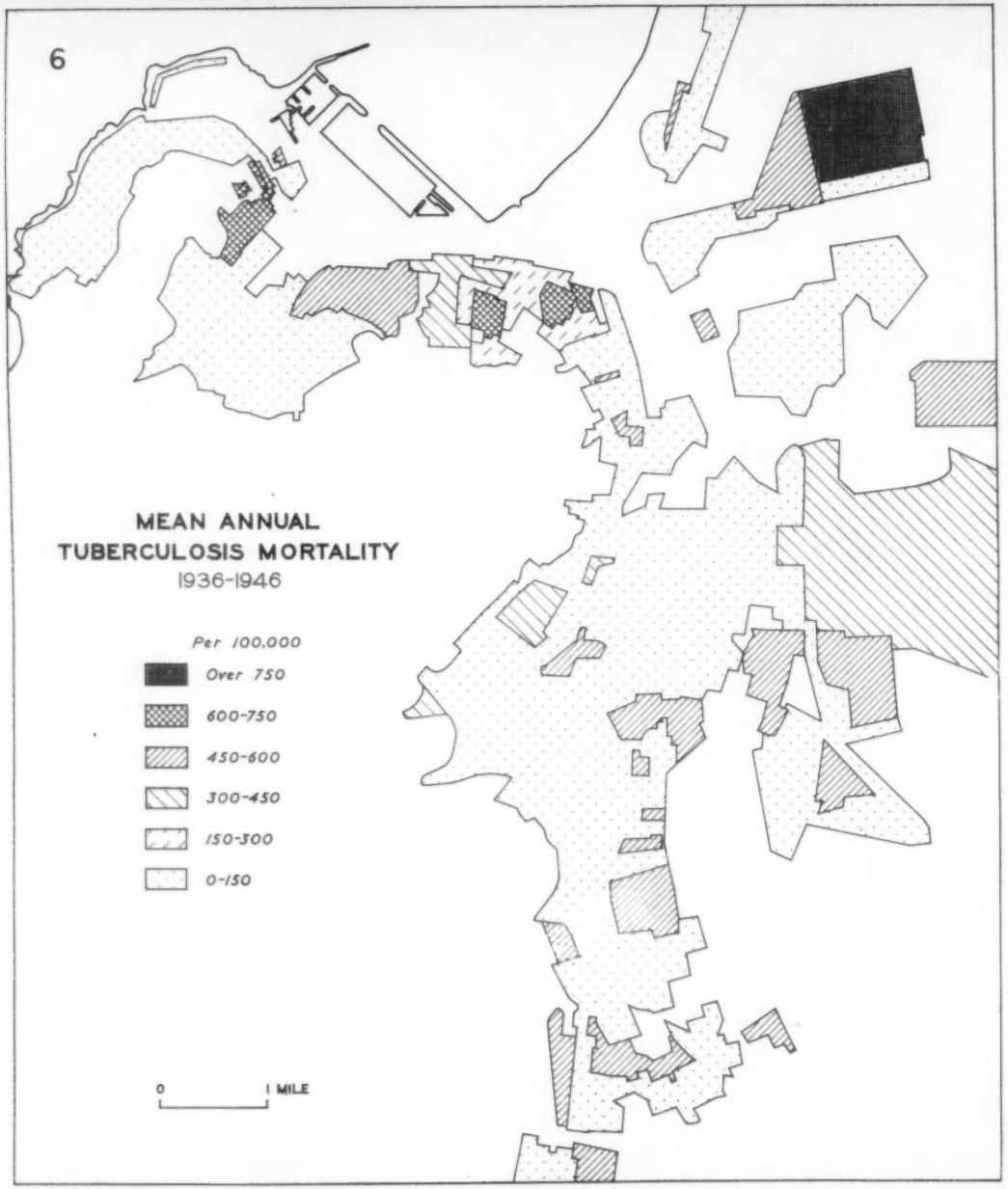


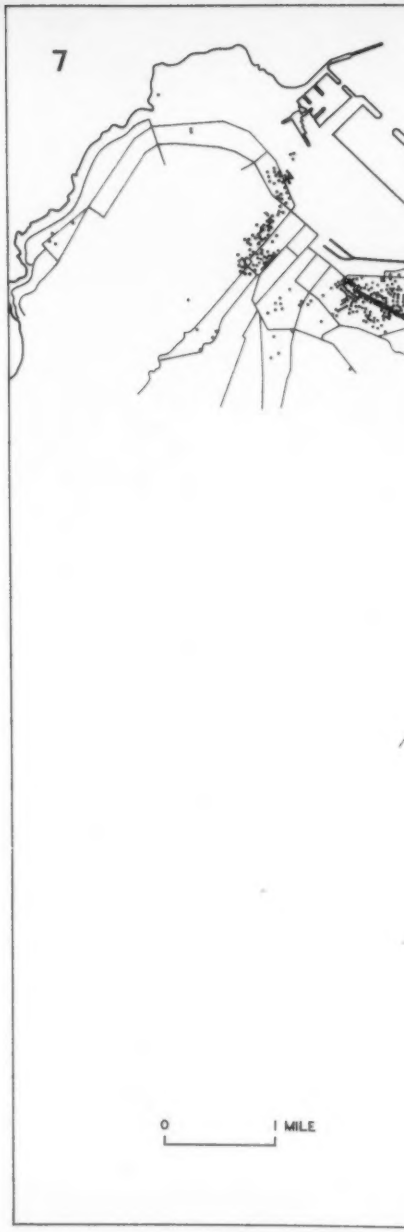
5

RATIO OF NON-EUROPEANS TO EUROPEANS
IN EUROPEAN RESIDENTIAL AREAS
1951

Percentage
Over 40
30-40
20-30
10-20
0-10

0 1 MILE





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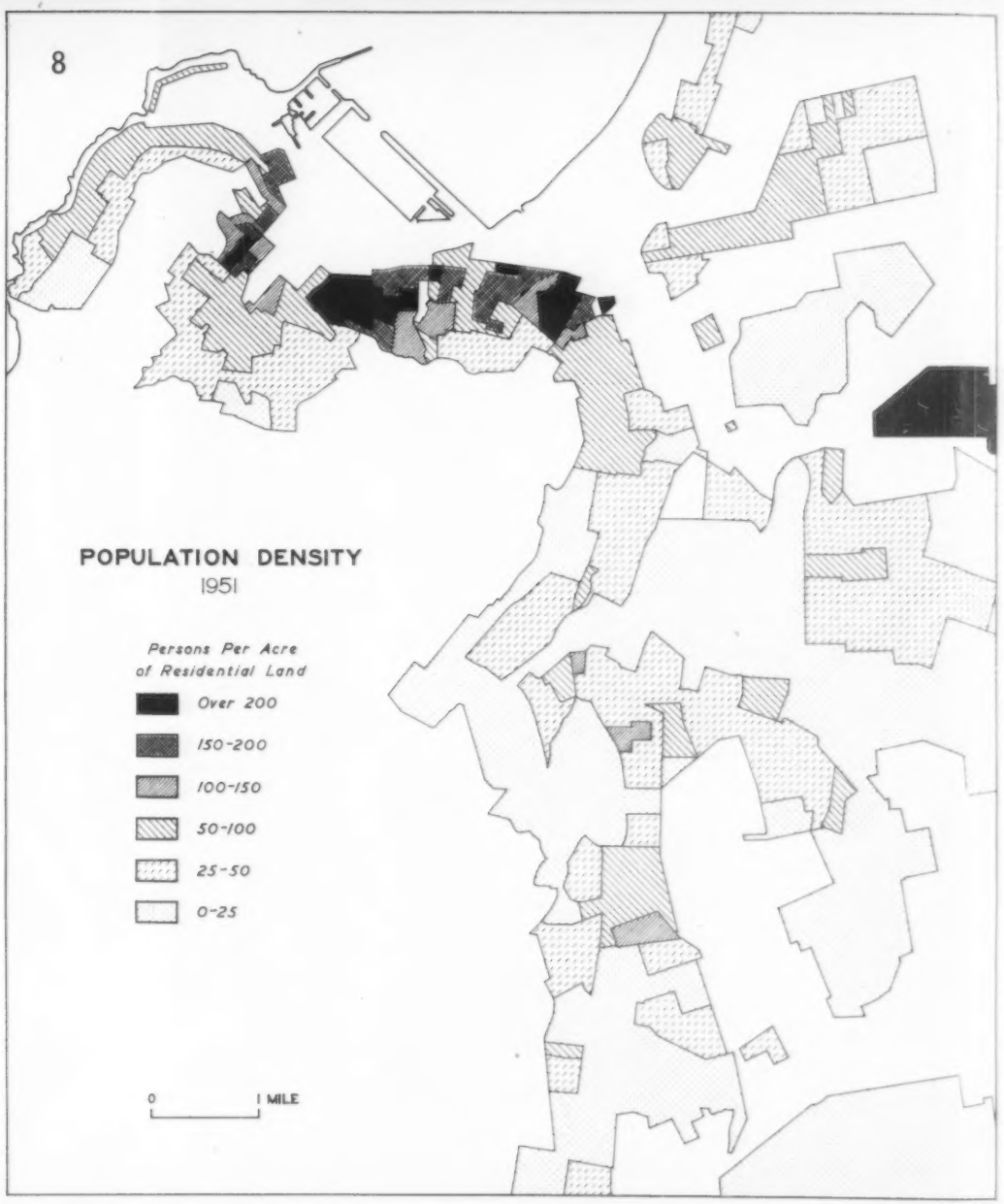
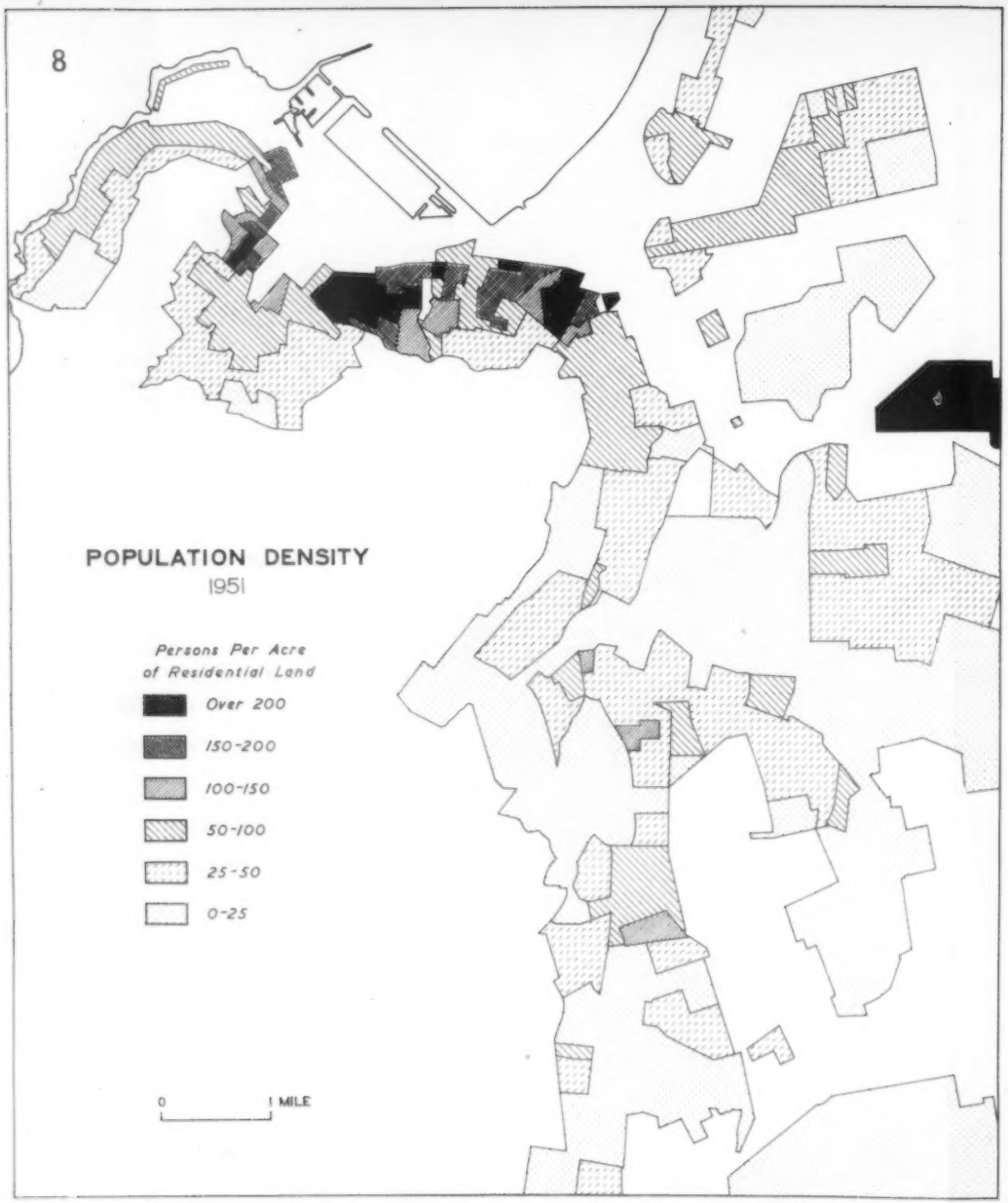
INDIAN SHOPS

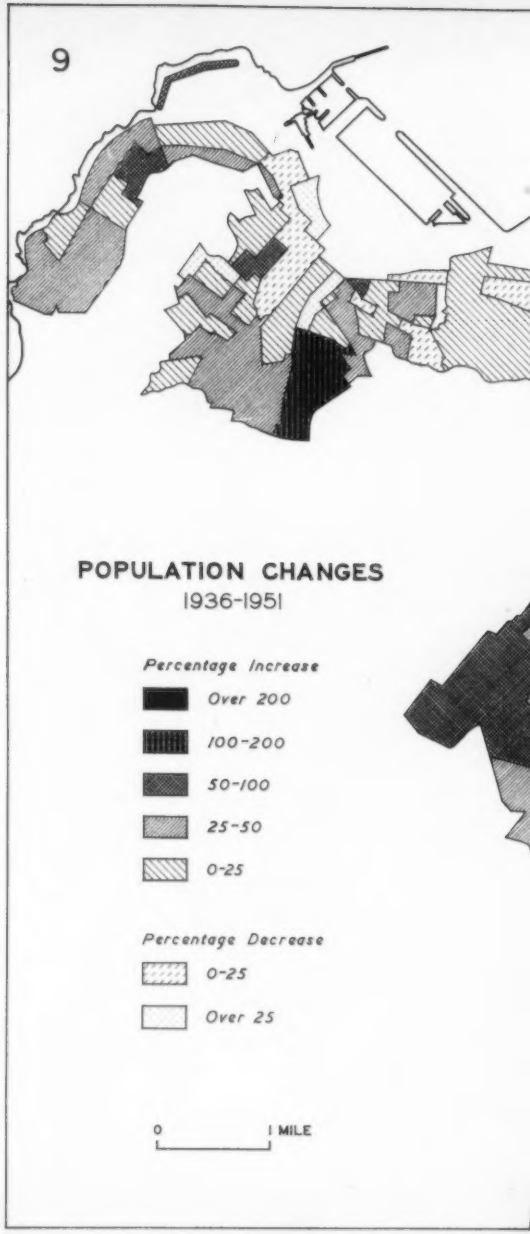

8
POPULATION DENSITY
1951
Persons Per Acre
of Residential Land
Over 200
150-200
100-150
50-100
25-50
0-25
0
1 MILE

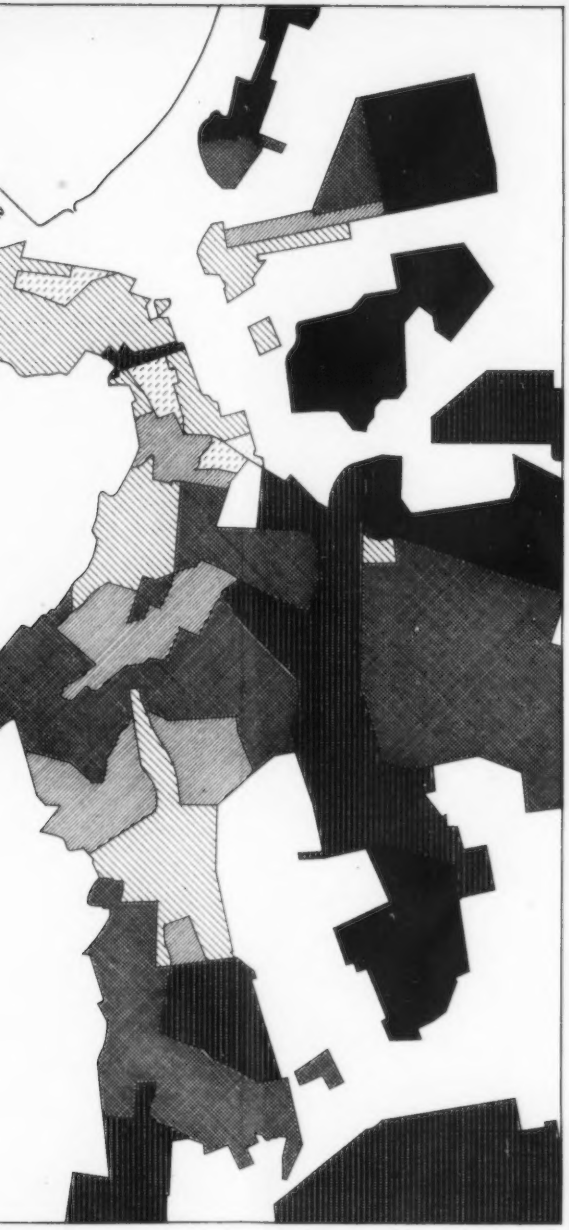
HOPS

8


POPULATION DENSITY
1951
Persons Per Acre of Residential Land
Over 200
150-200
100-150
50-100
25-50
0-25
0
1 MILE

9


POPULATION CHANGES
1936-1951
Percentage Increase
Over 200
100-200
50-100
25-50
0-25
Percentage Decrease
0-25
Over 25
0
1 MILE



10

CHANGES IN EUROPEAN AND NON-EUROPEAN POPULATION 1936-1951

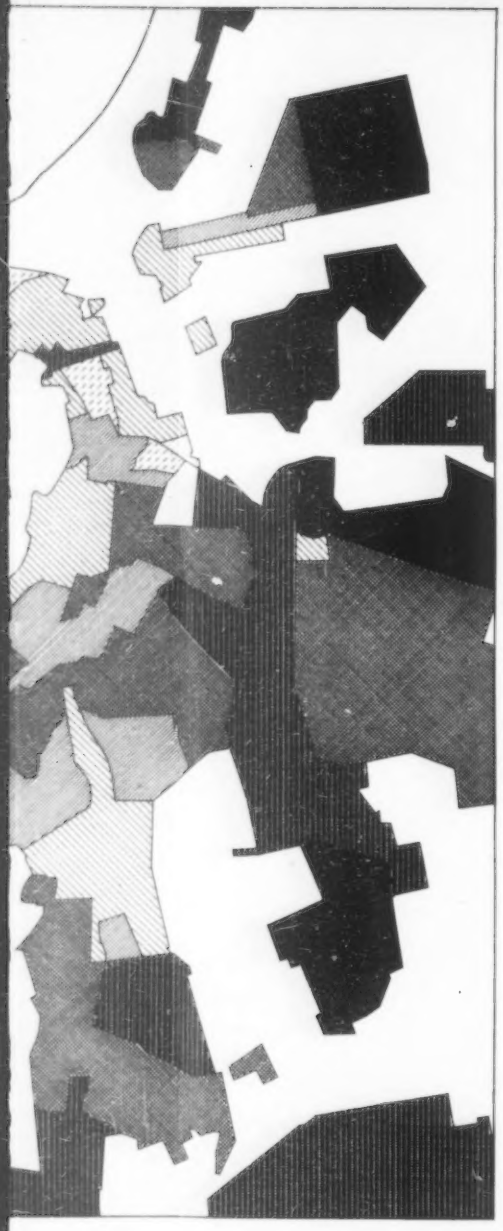
EUROPEAN	NON-EUROPEAN
Increase	Increase
Decrease	Decrease
Increase	Decrease
Decrease	Increase

CHANGES IN RACIAL PREDOMINANCE

1936	1951
Non-European	European
European	Non-European

0 1 MILE

CAPE TOWN
Scott



10

CHANGES IN EUROPEAN AND NON-EUROPEAN POPULATION 1936-1951

EUROPEAN	NON-EUROPEAN
Increase	Increase
Decrease	Decrease
Increase	Decrease
Decrease	Increase

CHANGES IN RACIAL PREDOMINANCE

1936	1951
Non-European	European
European	Non-European

0 1 MILE

CAPE TOWN
Scott

THE ROYAL GEOGRAPHICAL SOCIETY

KENSINGTON GORE, LONDON, S.W.7

FELLOWSHIP AND ASSOCIATE MEMBERSHIP

The object of the Society being the Promotion and Diffusion of Geographical Knowledge, it has always welcomed to its Fellowship those anxious to further this object by their interest and support, as well as those able to take a more active part in the work of discovery and exploration.

FELLOWSHIP

The Bye-Laws provide that a candidate for admission to the Fellowship of the Society must be proposed by a Fellow personally known to him and seconded by another Fellow. Further, that a candidate is not eligible until he (or she) is twenty-one years old, unless he holds a Commission in Her Majesty's Forces or he (or she) is a matriculated student of a University of the United Kingdom or the Self-Governing British Dominions. Proposal forms can be obtained on application to the Director and Secretary.

Every Fellow shall be required to pay on election *either* £4 as Entrance Fee and £4 as Annual Subscription for the current year and thereafter an Annual Subscription of £4 due on 1st January in each year; *or* a single compounding fee of £60.

The Entrance Fee and first Annual Subscription may be paid in four quarterly instalments of £2 each; *or* the Entrance Fee and first two Annual Subscriptions may be paid in four half-yearly instalments of £3 each. Thereafter the Annual Subscription may continue to be paid in four quarterly instalments of £1 each or two half-yearly instalments of £2 each respectively. Entrance Fee and Annual Subscription may be paid by instalments only where payment is made by Banker's Order. Half-yearly instalments shall be due on the 1st January and the 1st July; quarterly instalments shall be due on the 1st January, 1st April, 1st July and 1st October.

For Fellows who are under the age of 25 years on election the Entrance Fee shall be reduced from £4 to £2. The Entrance Fee and first Annual Subscription may be paid in four quarterly instalments of £1 10*s*. 0*d*. each or the Entrance Fee and first two Annual Subscriptions may be paid in four half-yearly instalments of £2 10*s*. 0*d*. each: thereafter payment may be by instalments as above. Entrance Fee and Annual Subscription may be paid by instalments only where payment is made by Banker's Order.

Fellows may compound for their Annual Subscriptions at any subsequent time by a payment of £60 less £2 for each Annual Subscription paid in excess of five with a minimum of £20 after 25 payments.

No Fellow shall be entitled to vote or to enjoy any privilege of the Society while in arrear.

ASSOCIATE MEMBERSHIP

The Bye-Laws covering the terms of Associate Membership provide that—

1. *A candidate must be not less than 17 and not more than 20 years of age. He (or she) must be recommended by a Fellow, University or School authority.*

2. *Subscription shall be £2 per annum without Entrance Fee.*

3. *On attaining the age of 21 Associate Members become eligible for Fellowship. The Entrance Fee of £2 shall be waived provided they have been Associate Members for 3 years. Otherwise Associate Membership shall cease at the age of 21.*

All subscriptions are payable in advance, on the 1st of January in each year.

PRIVILEGES OF FELLOWS AND ASSOCIATE MEMBERS

The privileges of a Fellow or Associate Member include admission (with one Friend) to all ordinary Meetings of the Society, and the use of the Society's House, Library and Map-room. Each Fellow is also entitled to receive a copy of *The Geographical Journal*. Associate Members have the choice of receiving either *The Geographical Journal* or *The Geographical Magazine*. Associate Members may not describe themselves as F.R.G.S. and have no vote at Annual or Special General Meetings.

A pamphlet giving details of the Society and a copy of the Charter and Bye-Laws will be sent on application to the Director and Secretary.

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